

31761 056513096

HYDE
DECK MACHINERY

HYDE WINDLASS COMPANY
BATH, MAINE. U.S.A.

M
361
194
1915
c.1
ROBARTS



Presented to the
LIBRARY of the
UNIVERSITY OF TORONTO
by
KENNETH R. REESOR

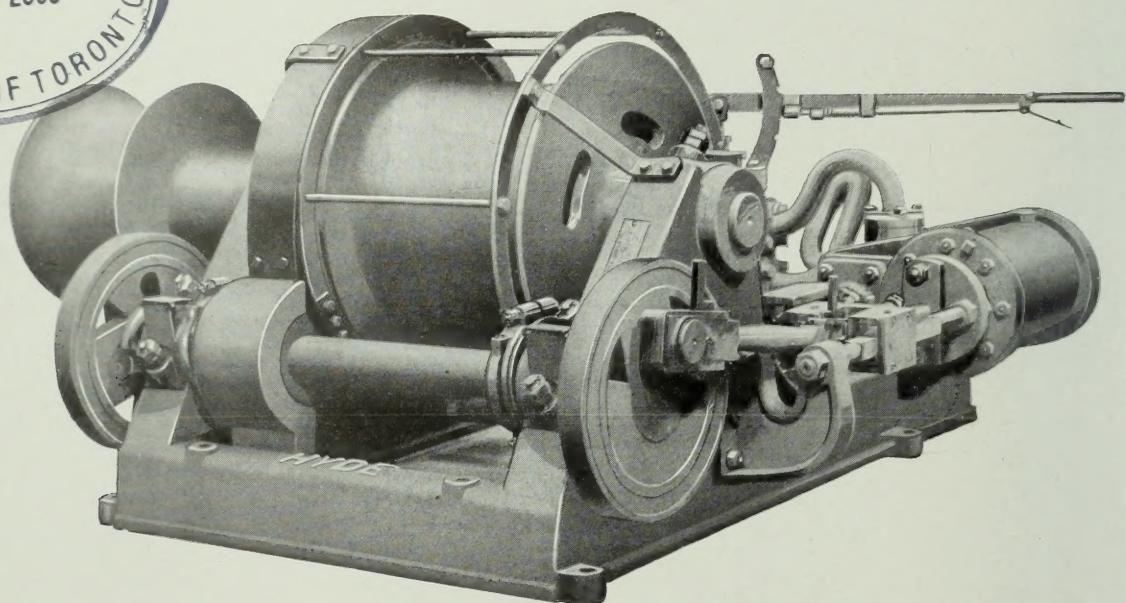
HYDE

STEAM CARGO WINCH



HYDE WINDLASS COMPANY
Bath, Maine
No. 17

LIBRARY
DEC 01 2003
UNIVERSITY OF TORONTO



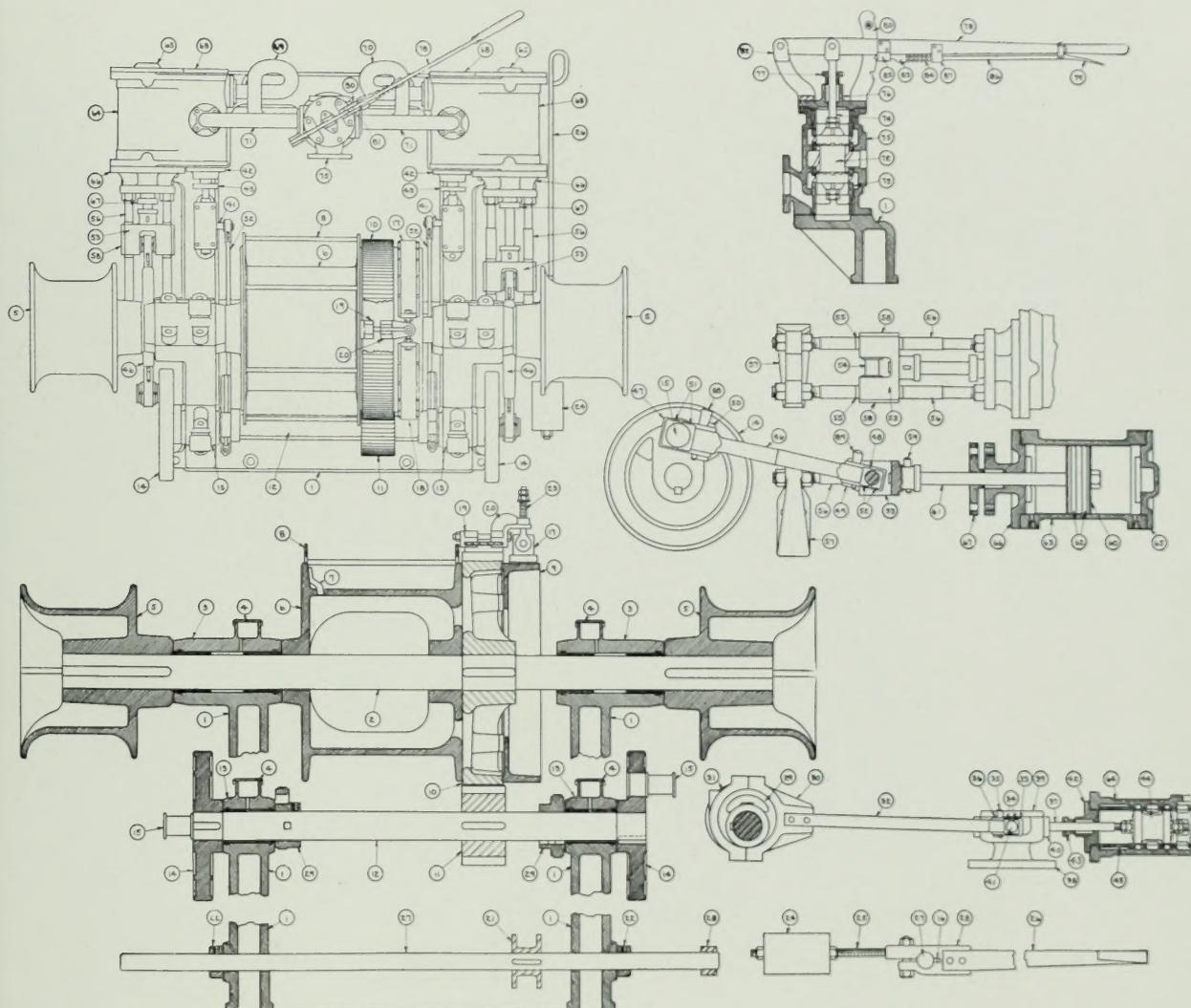
THE HYDE STEAM CARGO WINCH

A high grade winch designed for rapid handling of cargo made in sizes $8\frac{1}{4} \times 8$ and $8\frac{1}{4} \times 10$.

Winches of this type have been installed on the S. S. "Malolo," "Malika," "Bienville," "Dixie," "El Oceana," "Finland," "Kroonland," "Katrina," "Luckenbach," "Walter Luckenbach," "Marnie," "Aisne," "Anaconda," "Eastern Dawn," "Eastern Glade," "Imoko," "Volunteer," "Independence," "J. L. Luckenbach," "Julia Luckenbach," "Edward Luckenbach," "F. J. Luckenbach."

All bearings throughout winch have adjustable bronze boxes. The gearing is steel with machine cut teeth. Piston rods and valve stems are made of monel metal. Copper piping between cylinders, and metallic packing is fitted in the stuffing boxes.

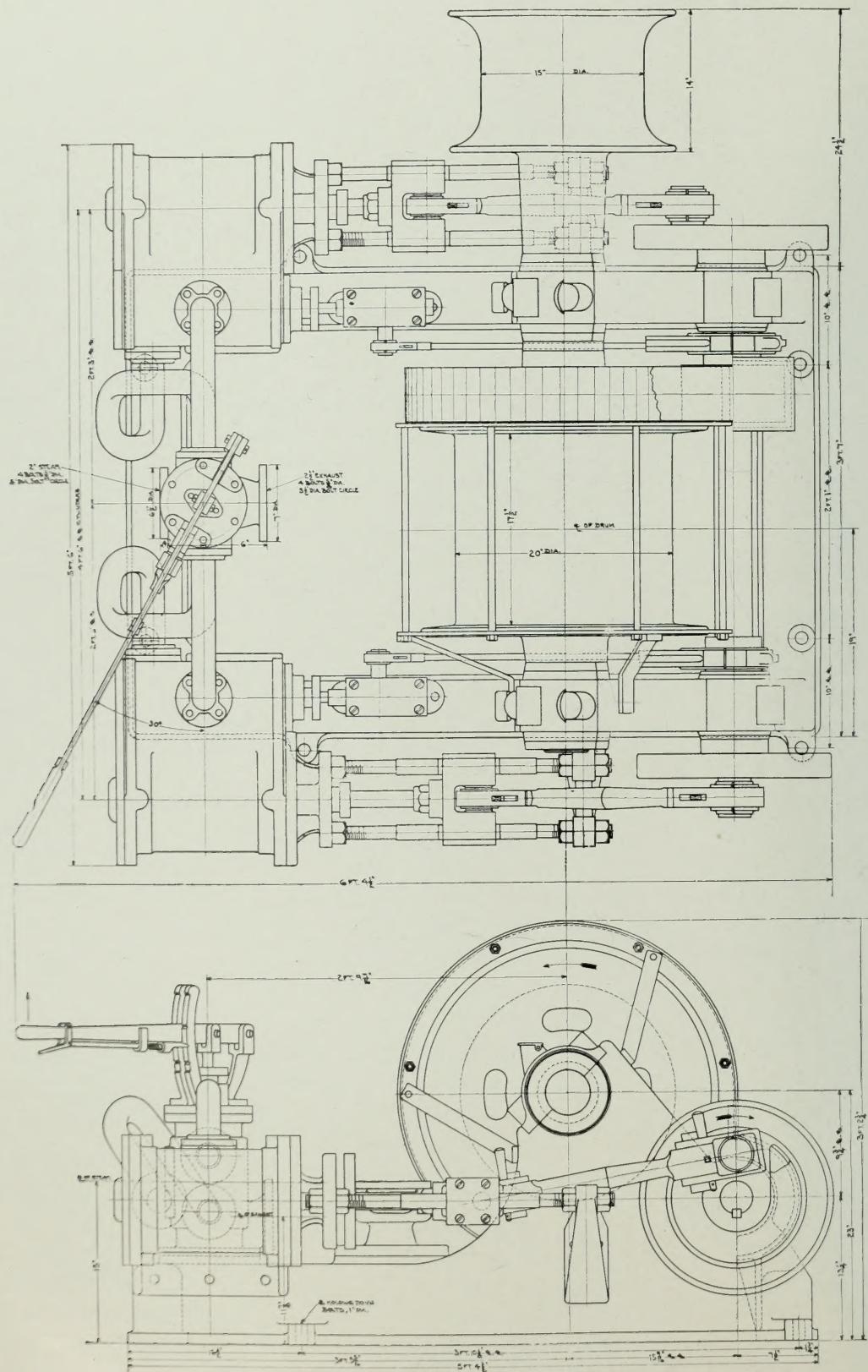
LIST OF PARTS FOR STEAM CARGO WINCH



LIST OF PARTS

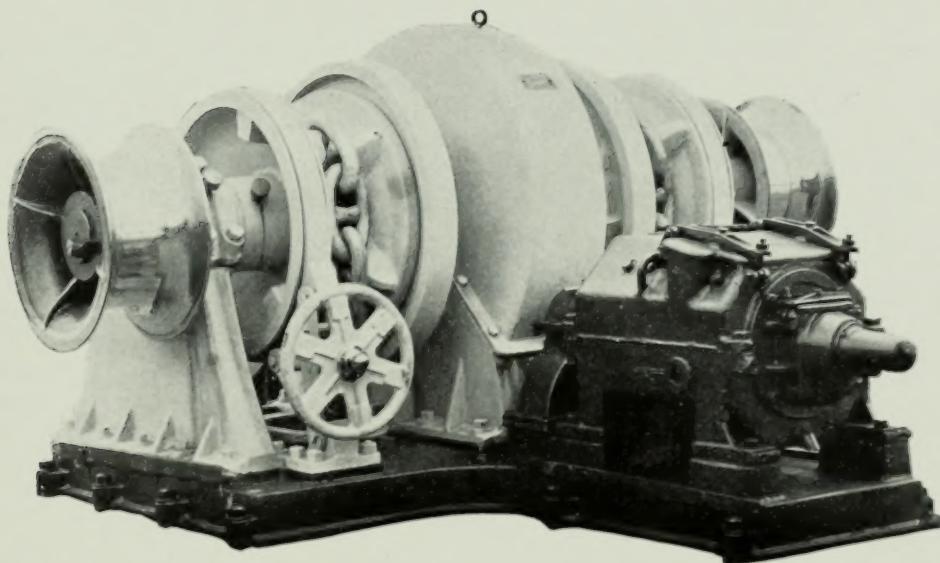
No. of Parts	Name of Parts	No. of Parts	Name of Parts	No. of Parts	Name of Parts
1	Bedplate and Side Bearings.	30	Eccentric Strap (Half).	60	Piston.
2	Drum Shaft.	31	" "	61	" Rod.
3	" " Bearing Cap.	32	Rod.	62	" Ring.
4	Oil Box Cover.	33	Strap.	63	Cylinder.
5	Head.	34	Box (Half).	64	"
6	Drum.	35	Key.	65	" Head.
7	Wire Rope Clip.	36	Gib.	66	" " and Stuffing Box.
8	Rope Guide Complete	37	Valve Stem.	67	Gland.
9	Friction Rim.	38	" Guide.	68	Steam Chest Cover.
10	Spur Gear.	39	" " Cap.	69	Copper Pipe.
11	" Pinion.	40	Block.	70	" "
12	Crank Shaft.	41	Pin.	71	" "
13	" " Bearing Cap.	42	Stuffing Box.	72	Reverse Valve.
14	" Disk.	43	" " Gland.	73	" Liner.
15	" Pin.	44	Piston Valve.	74	" Stem.
16	Special Key.	45	" Liner.	75	" Body.
17	Friction Band (Half).	46	Connecting Rod.	76	" Head and Stuffing Box.
18	" " "	47	" Strap.	77	" Stuffing Box Gland.
19	" " Support	48	" "	78	Lever.
20	" " "	49	Gib.	79	" Grip.
21	" Cam.	50		80	" Quadrant (Half).
22	Collar.	51	Crank Pin Box (Half).	81	" "
23	Hanger Eye Bolt.	52	Crosshead Pin Box (Half).	82	Bracket.
24	Counterweight.	53	Crosshead.	83	Latch.
25	" " Rod.	54	Pin.	84	Spring.
26	Foot Lever.	55	Gib.	85	" Guide.
27	" " Shaft.	56	Slide.	86	" Rod.
28	" " " Shaft and Counterweight.	57	Bracket.	87	" " Guide.
29	Holder.	58	Cap.	88	Connecting Rod Key.
	Eccentric Sheave.	59	Key.	89	" "

PLAN OF HYDE STEAM CARGO WINCH



HYDE

WINDLASSES AND STEERING GEARS
for
YACHTS AND MOTOR BOATS



ELECTRIC WINDLASS

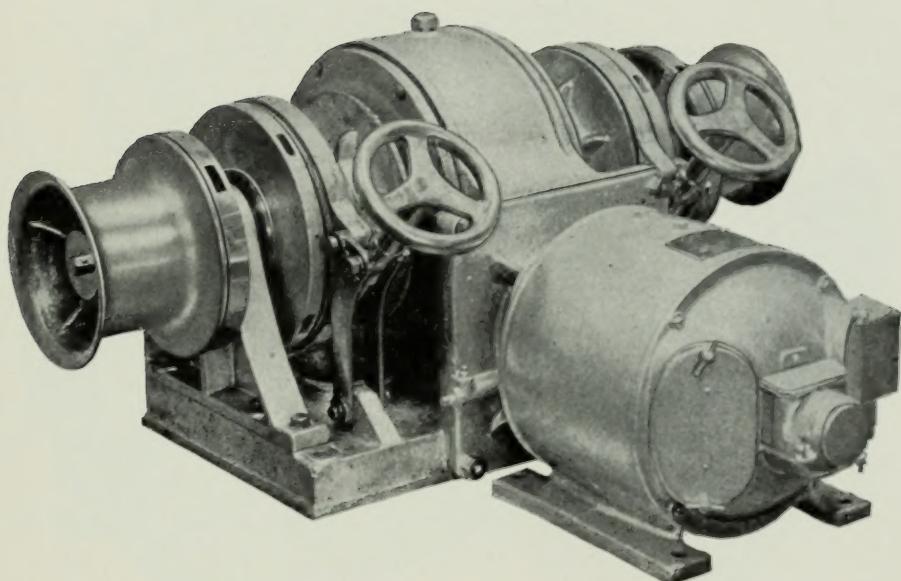
As Installed On
YACHT CORSAIR

HYDE WINDLASS COMPANY
BATH, MAINE

No. 19

AN IMPORTANT CONSIDERATION in the design of windlasses, capstans, winches and steering gears for installation on yachts or motor boats is that all parts of the machine be readily accessible. This is especially important in assembly of the electric motor with mechanical parts. An examination of the illustrations in this catalog shows all motors in the open where they can be quickly opened up for examination or adjustment. The gearing on all machines is enclosed in oil tight housing. All gear teeth are accurately hobbed and worm threads milled. Ball or roller bearings to take thrust of worm. In most instances yacht auxiliaries for locating on deck have mechanical parts galvanized with bronze trimmings. We are in position to furnish any type or size of auxiliaries to meet specifications.

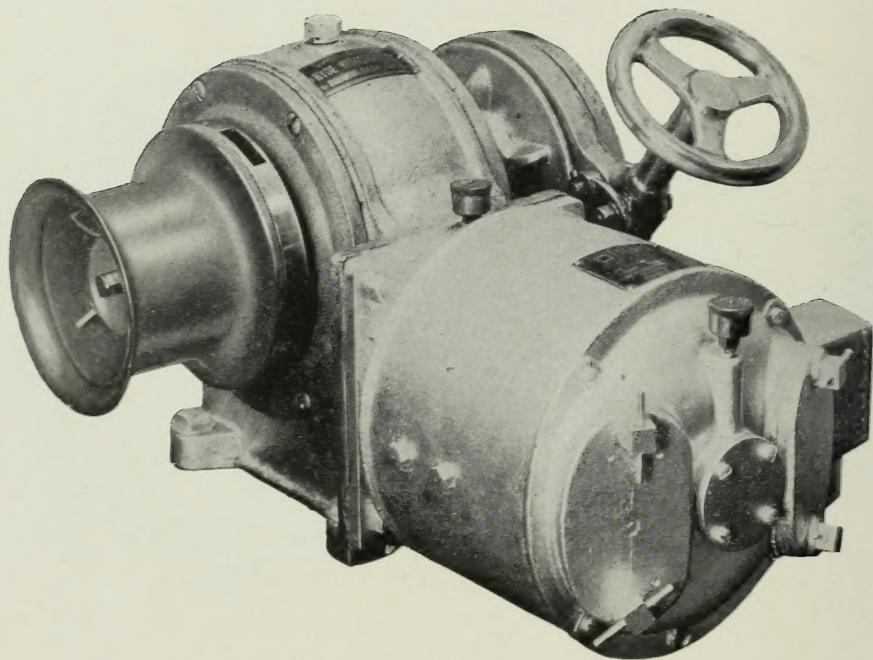
Hyde Electric Ratchet Windlass



Two Wildcats and Two Gypsys

Size	Diam. Chain	Motor H.P.	Diam. Gypsy	Length F-A	Width	Height	Distance Between Chains	Weight	Capacity	
									Pounds	Feet
C	1/4"-3/8"	1	5"	21 3/4"	30 3/4"	13 1/2"	9 1/2"	400	660	25
B	7/16"-1 1/2"	1 1/2-2	6"	32"	35 1/4"	16 3/4"	11 1/2"	635	1000	25
A-A	9/16"-5/8"	3-4	7"	35 1/4"	42"	20 3/8"	13"	850	2000	25

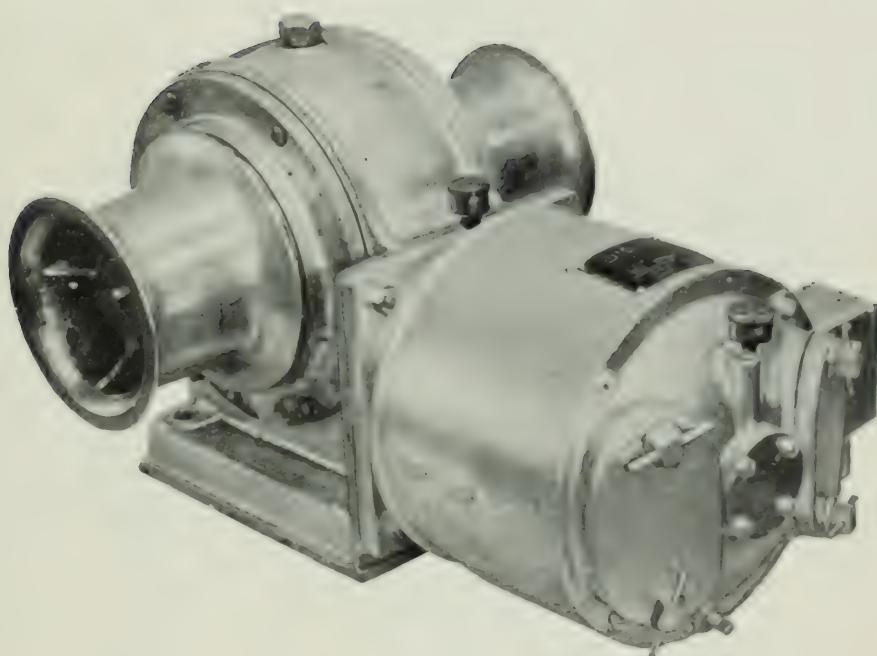
Hyde Electric Ratchet Windlass



One Wildecat and One Gypsy

Size	Diam. Chain	Motor H.P.	Diam. Gypsy	Length F-A	Width	Height	Weight	Capacity		Distance Chain from Centre
								Pounds	Feet	
C	1/4"-3/8"	1	5"	21 3/4"	17 3/4"	13 1/2"	285	660	25	4 3/4"
B	5/16"-1/2"	1 1/2-2	6"	32"	20 3/4"	16 3/4"	400	1000	25	5 3/4"
A-A	9/16"-5/8"	3-4	7"	35 1/4"	24 1/4"	20 3/8"	670	2000	25	6 1/2"

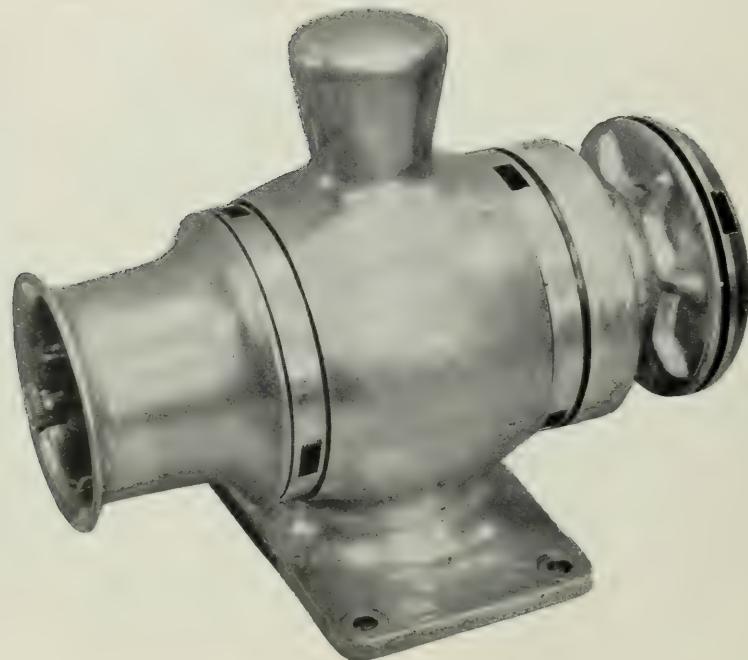
Hyde Electric Boat Winch



This winch is used for general purposes such as warping, hoisting boats or hoisting anchor with cables. We make them in all sizes and capacities.

Size	Diam. Gypsy	Motor H.P.	Length F. A	Width	Height	Weight	Capacity	
							Pounds	Feet
C	5"	1	21 $\frac{3}{4}$ "	15 $\frac{7}{8}$ "	13 $\frac{1}{2}$ "	233	350	50
B	6"	2	32 $\frac{1}{4}$ "	18 $\frac{1}{8}$ "	17"	385	800	50
A A	7"	3						

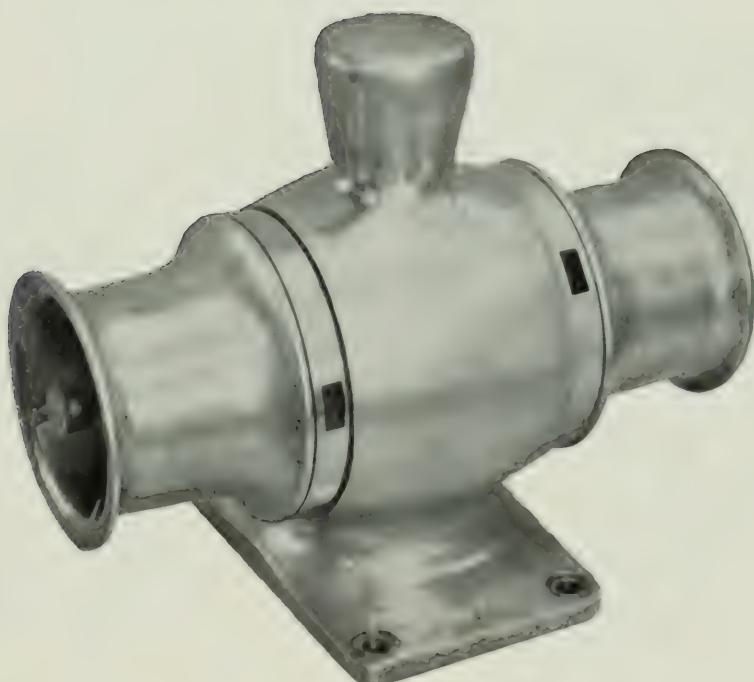
Hyde Ratchet Windlass



One Wildecat and One Gypsy

Size	Diam. Chain	Diam. Gypsy	Length F-A	Width	Height	Weight	Lift	Distance Chain From Centre
C	1 $\frac{1}{4}$ " - 3 $\frac{1}{2}$ "	1 $\frac{3}{4}$ "	10	17 $\frac{3}{8}$ "	13"	100	400	6"
B	1 $\frac{1}{2}$ " - 2 $\frac{1}{2}$ "	5 $\frac{3}{4}$ "	12	20 $\frac{3}{8}$ "	15"	185	600	7 $\frac{1}{4}$ "
A - A	1 $\frac{1}{2}$ " - 3 $\frac{1}{2}$ "							

Hyde Ratchet Gypsy

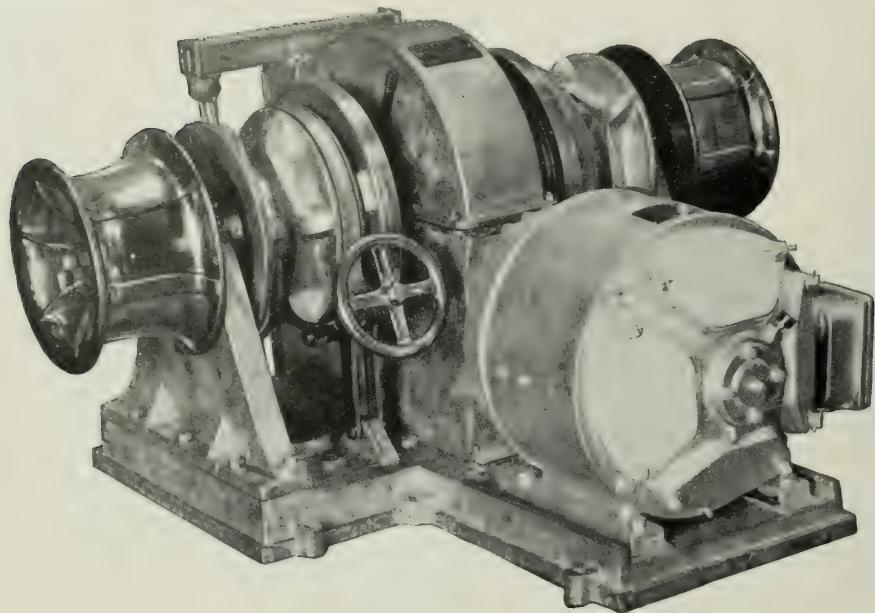


Two Gypsys

Size	Diam. Gypsy	Length F-A	Width	Height	Weight	Pull
C	4 $\frac{3}{4}$ "	10	16 $\frac{1}{4}$ "	13"	90	400
B	5 $\frac{3}{4}$ "	12	18 $\frac{1}{2}$ "	15"	170	600
A-A						

Hyde Electric Windlass

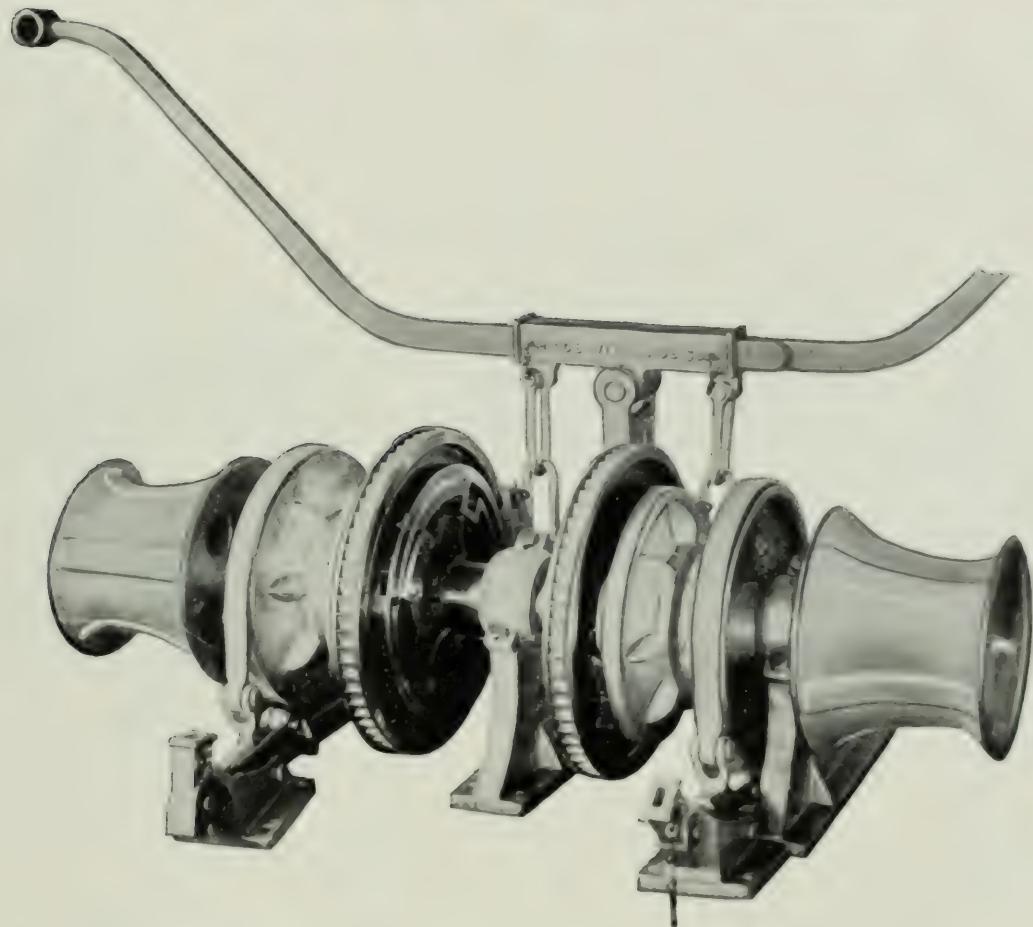
with Pump Brakes



Two Wildcats and Two Gypsys

Size	Diam. Chain	Motor H.P.	Diam. Gypsy	Length F and A	Width	Height	Weight	Distance Between Chains
A	3 1/4"	5 1/2	7"	3'-8 1/4"	4'-3"	22 1/2"	1720	20 1/2"
O	7 1/8"	7 1/2	10"	4'-5"	4'-5 1/4"	2'-4 1/8"	2800	25"
1	1"	10	10"	5'-8"	5'-3"	2'-10 1/2"	4000	2'-7"
2	11 1/8"	12	12"	6'-2"	6'-6 1/2"	3'-3"	6300	2'-10 1/4"
3	1 1/4"	15	13 1/2"	6'-6"	6'-11"	3'-5 1/2"	6800	2'-10"
4	13 1/4"	20	13 1/2"	6'-8 1/2"	6'-11"	3'-5 1/2"	7300	2'-10"
5	1 1/2"	25	16"	7'-2"	8'-1"	3'-11"	11000	3'-5 1/2"
6	15 1/2"	30	16"	7'-10"	8'-2"	4'-4 1/2"	13000	3'-6 1/2"
7	13 1/4"	35	16"	8'-1"	8'-8"	4'-6"	15000	3'-8"

Hyde Pump Brake Windlass

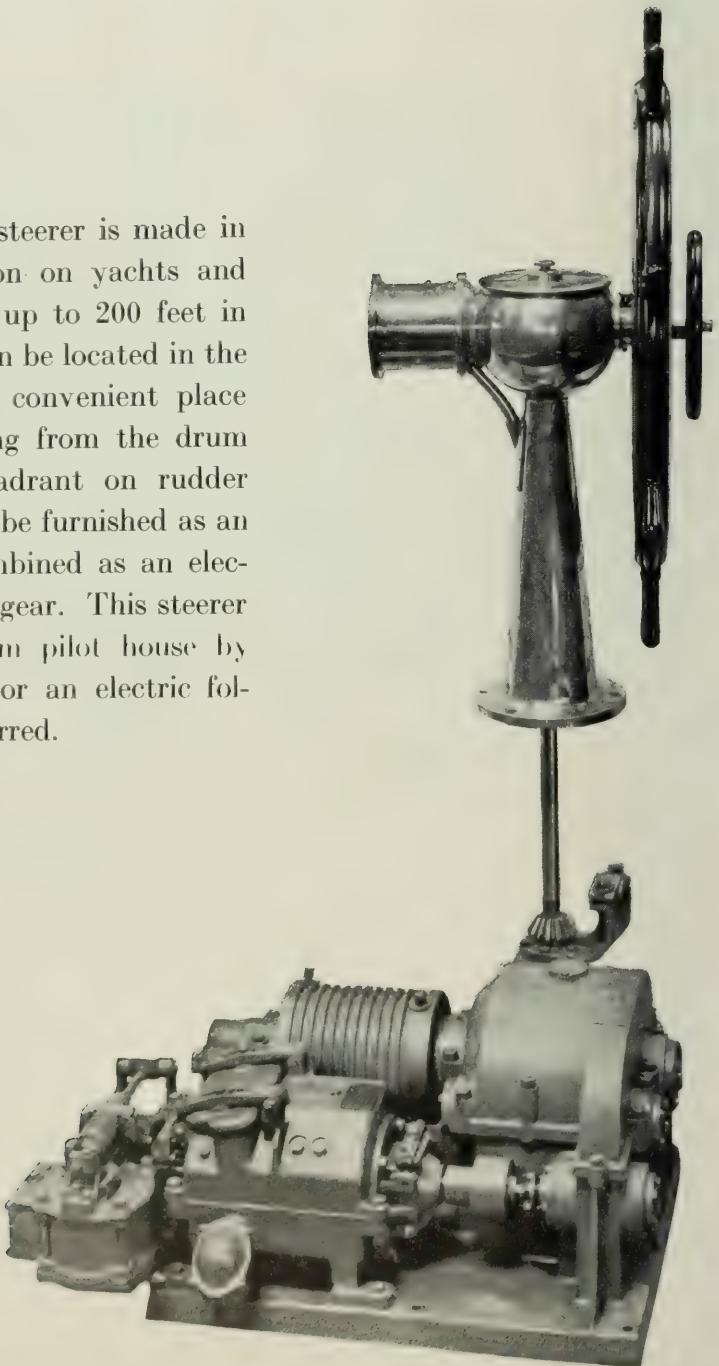


Two Wildcats and Two Gypsys

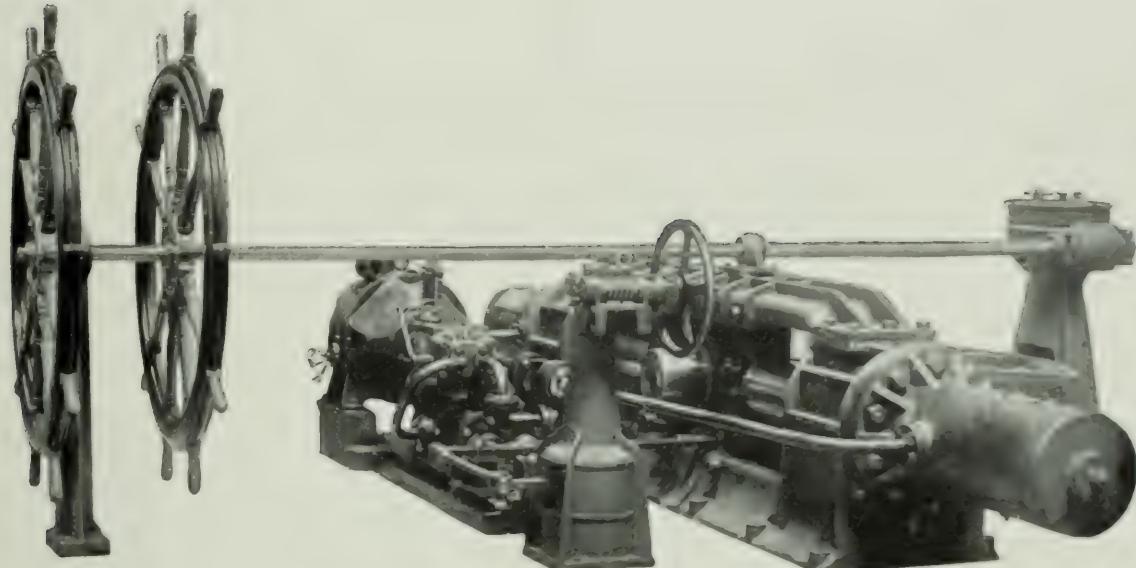
Size	Diam. Chain	Diam. Gypsy	Length F and A	Width	Height	Weight	Distance Between Chains
C	1 $\frac{1}{4}$ " - 3 $\frac{1}{8}$ "	1 $\frac{3}{4}$ "	2' 0"	3' 0"	16	330	13 $\frac{1}{2}$ "
B	7 $\frac{7}{16}$ " - 1 $\frac{1}{2}$ "	5"	2' 3 $\frac{1}{2}$ "	3' 4 $\frac{1}{4}$ "	18	460	15 $\frac{1}{8}$ "
A - A	9 $\frac{9}{16}$ " - 5 $\frac{5}{8}$ "	7"	2' 5"	3' 9"	20	650	17 $\frac{1}{4}$ "
A	11 $\frac{11}{16}$ " - 3 $\frac{3}{4}$ "	7"	2' 8"	3' 10 $\frac{1}{4}$ "	21	850	18 $\frac{1}{4}$ "
O	15 $\frac{15}{16}$ " - 7 $\frac{7}{8}$ "	10"	3' 0"	4' 0"	26	1100	20 $\frac{1}{4}$ "

Hyde Electric Drum Steerer

The electric drum steerer is made in all sizes for installation on yachts and other types of vessels up to 200 feet in length. This steerer can be located in the engine room or other convenient place with wire ropes leading from the drum aft connecting to quadrant on rudder post. This steerer can be furnished as an electric steerer, or combined as an electric and hand steering gear. This steerer can be controlled from pilot house by electric non-follow-up or an electric follow-up control as preferred.



Hydro-Electric Steering Gear

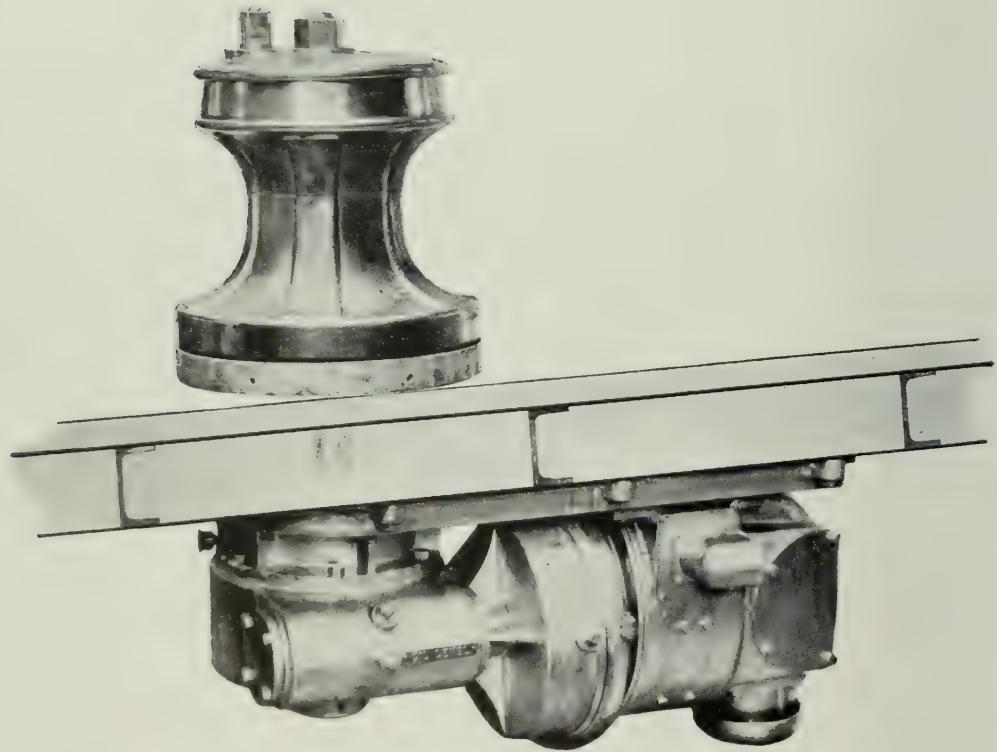


The hydro-electric steering gear was designed for installation primarily on diesel or electrically equipped vessels. This is a very efficient type of steering gear, quiet in operation and requiring very little attention as oil is used in the system. The power consists of an electric motor operating a variable stroke pump at constant speed. The oil from the pump is delivered to the ram cylinders under pressure up to 800 lbs., although even higher pressures are used where it is desired to save weight in the steering gear. Automatic follow-up mechanism is provided, controlled from bridge or pilot house. Hand steering connections can be furnished same as shown in cut. The larger vessels, however, have dual pumping units and omit hand wheels and gearing. This type of steering gear has been furnished for such yachts as the "HI-ESMARO," "VANDA," "CORSAIR," "SAVARONA," also the principal merchant vessels built in the past twelve years including the "CALIFORNIA," "VIRGINIA," "PENNSYLVANIA," "GULFPRIDE," "GULFCREST," "J. W. VANDYKE," "SANTA CLARA," "SANTA ROSA," "SANTA PAULA," "SANTA LUCIA," "SANTA ELENA," "ST. JOHN," "ARCADIA," "G. HARRISON SMITH," "W. S. FARISH" and "BORINQUEN."

Hyde Electric Capstan

with

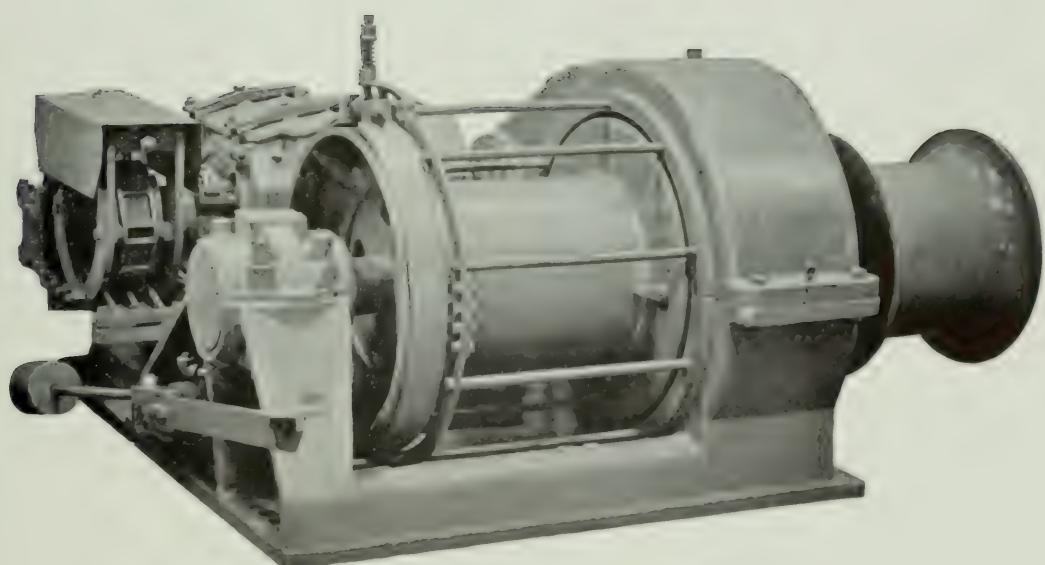
Hand Crank Operation



The electric capstan illustrated above designed for handling rope, chain or cable is generally used on large motor boats or yachts where space forward is not sufficient for a horizontal windlass. This type of electric capstan can also be installed aft for warping purposes. The capstan has internal gears and when operated by hand crank makes a powerful equipment. The capstan can be furnished in any size with motor and gearing below deck as shown in cut, or made a self-contained unit for locating above deck. A gypsy can be supplied in place of a capstan if preferred. We gladly send plans and quote prices upon receipt of requirements.

HYDE

ELECTRIC CARGO WINCH



HYDE WINDLASS COMPANY

Bath, Maine

No. 20

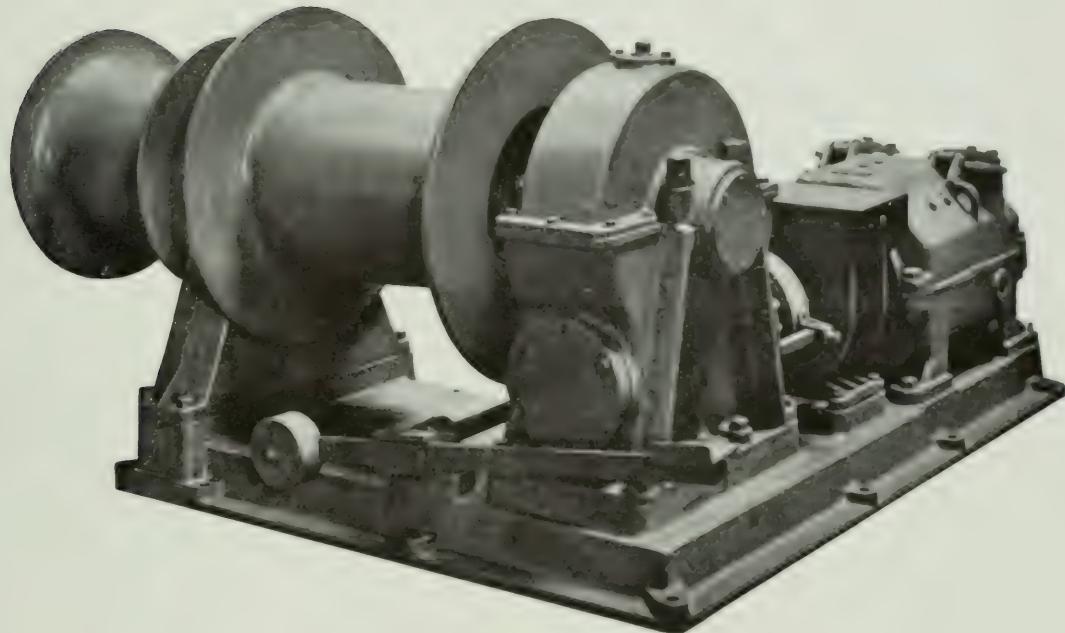
I n t r o d u c t o r y

HYDE ELECTRIC CARGO WINCH

THREE are two types of electric cargo winches illustrated in this Bulletin; the spur geared type on page 7 and worm geared type on page 3. Both of these winches have a very high efficiency. They are generally furnished with a single drum and one gypsy. The winches are made rights and lefts for assembling in pairs at each hatch. The gearing is enclosed in oil-tight housing, thus assuring constant lubrication. The worm geared winch has the gear made of hard gear bronze with teeth accurately hobbed. The worm shaft is forged of alloy steel, threads of worm are milled, heat treated and finished to a high degree of accuracy. Ball bearings are fitted on the worm shaft to take both radial and thrust loads. In the case of the spur geared winches there are two sets of gear reduction. The pinions are made of forged steel and the gears of cast steel. The teeth of the gearing are accurately cut. Winches are equipped with marine water-tight motors self-contained on bedplate with winch. Each motor is equipped with a solenoid brake, also foot brakes are fitted in addition if required. Upon receipt of specifications we will be glad to furnish plans and prices for either the worm or spur geared type winch of any capacity for cargo handling.

ELECTRIC CARGO WINCH

Worm Geared Type

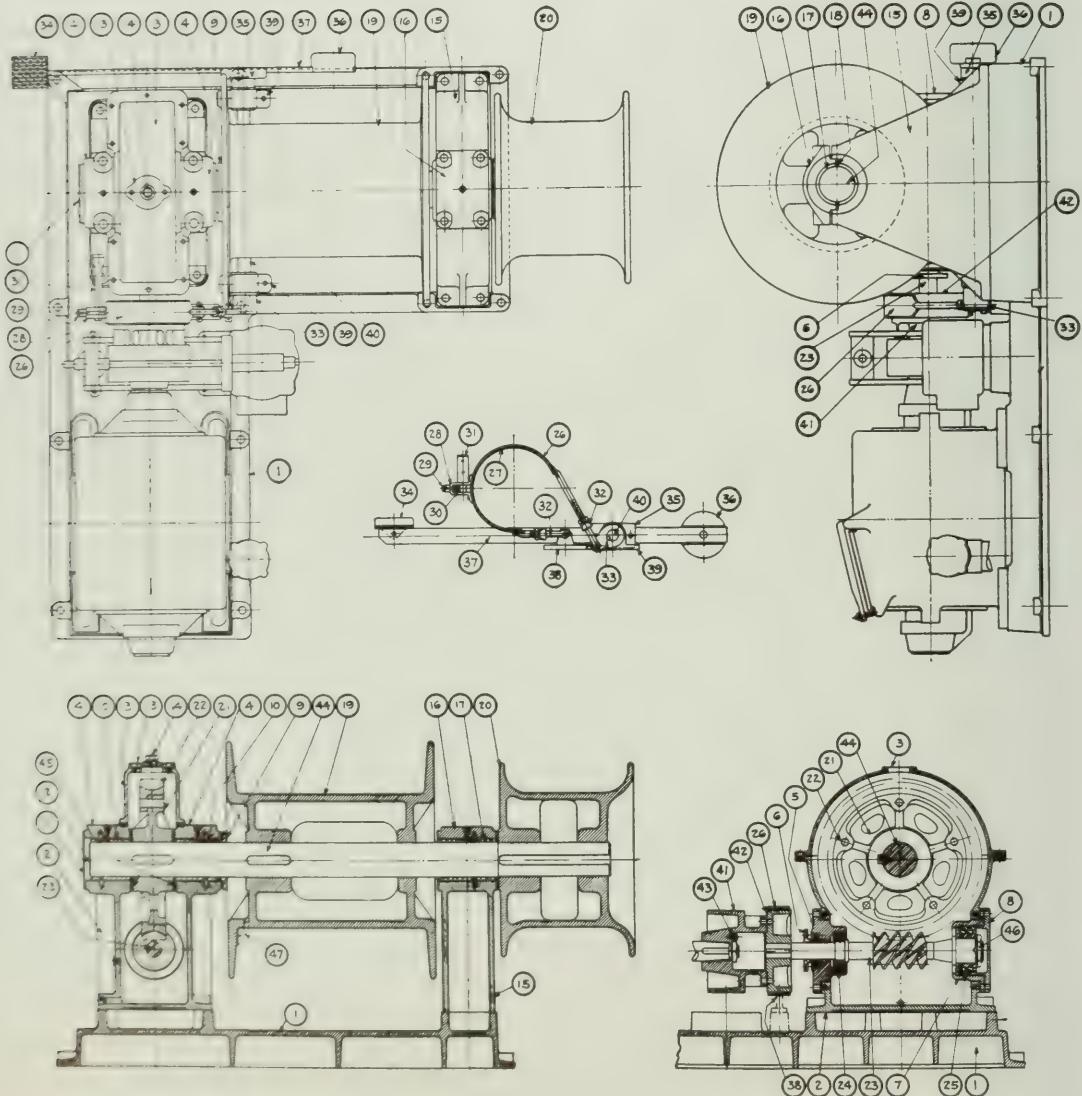


A high speed cargo winch, very quiet in operation. Winches of this type are installed on the Panama Mail Line, S.S. "SANTA ROSA," "SANTA LUCIA," "SANTA PAULA" and "SANTA ELENA." This worm geared winch is made in three sizes, two, three and five-ton. The overall dimensions and weight are given on page 6, list of parts on pages 4 and 5. A powerful and efficient cargo winch. The light line speed is around 800 feet per minute.

Size	H.P.	Capacity-Pounds	Speed-Rope	Weight
2-Ton	25	1000 to 4000	330' to 200'	5670
3-Ton	35	2000 to 6000	350' to 240'	6335
5-Ton	50	2000 to 10000	325' to 130'	8745

ELECTRIC CARGO WINCH

Worm Geared Type



ELECTRIC CARGO WINCH

Worm Geared Type

No. LIST OF PARTS

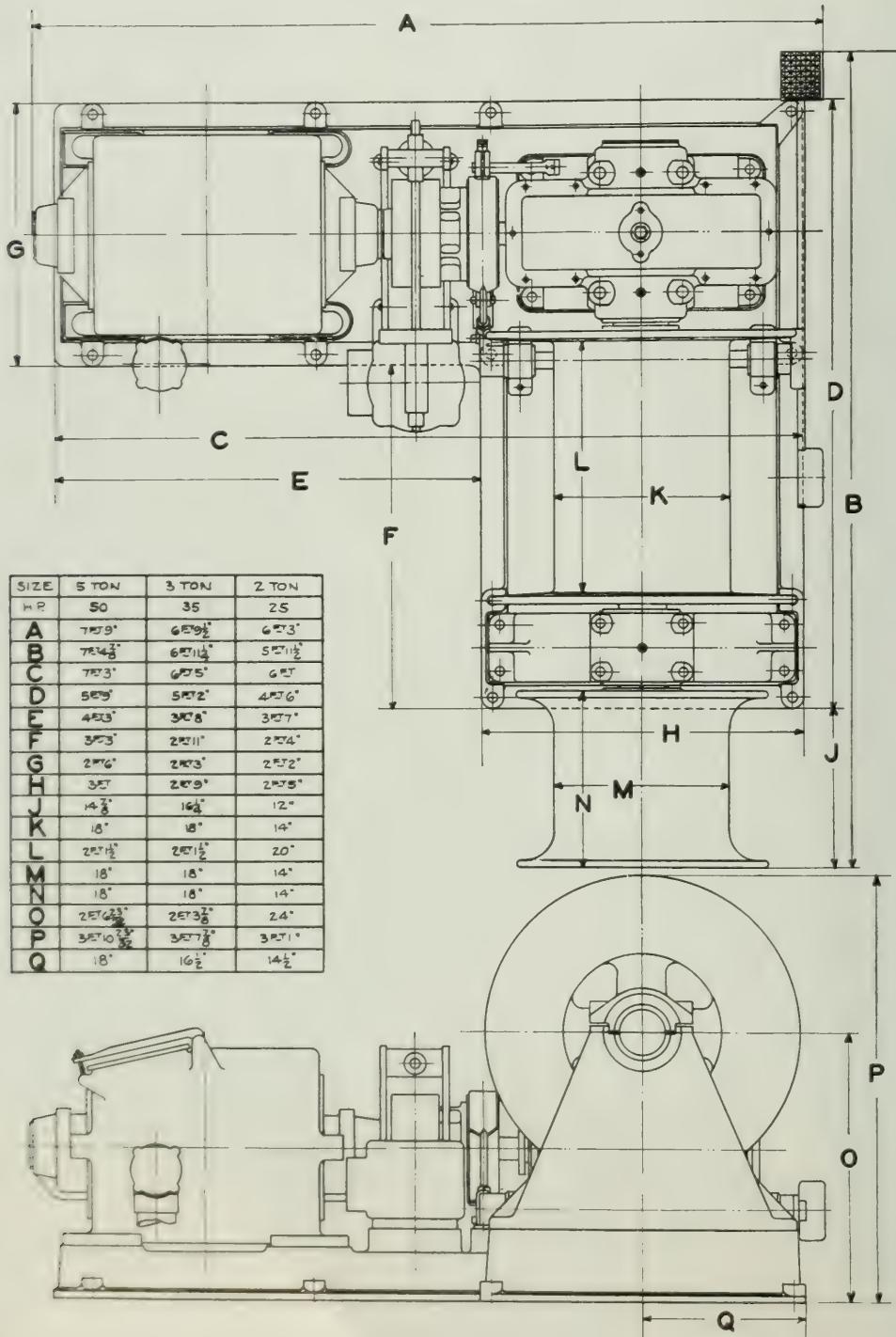
- 1 Bed Plate.
- 2 Gear Casing.
- 3 Gear Casing Cover.
- 4 Main Bearing Cap.
- 5 Radial Ball Bearing Cage.
- 6 Stuffing Box Gland.
- 7 Thrust Ball Bearing Cage.
- 8 Thrust Ball Bearing Retainer.
- 9 Drum Shaft Gland.
- 10 Bearing Box.
- 11 Cover Plate.
- 12 Main Bearing Liners.
- 13 Oil Hole Cover.
- 14 Vent Plug.
- 15 Drum Shaft Bearing.
- 16 Drum Shaft Bearing Cap.
- 17 Drum Shaft Bearing Box.
- 18 Drum Shaft Bearing Liner.
- 19 Drum.
- 20 Head.
- 21 Worm Gear Center.
- 22 Worm Gear Rim.
- 23 Worm Shaft.
- 24 Radial Ball Bearing.

No. LIST OF PARTS

- 25 Thrust Ball Bearing.
- 26 Friction Band.
- 27 Friction Band Lining.
- 28 Friction Band Adjusting Yoke.
- 29 Friction Band Adjusting Screw.
- 30 Friction Band Adjusting Spring.
- 31 Friction Band Support.
- 32 Friction Band Turnbuckle.
- 33 Friction Lever.
- 34 Friction Foot Lever Pedal.
- 35 Friction Lever Hub.
- 36 Friction Lever Counter-weight.
- 37 Friction Foot Lever.
- 38 Friction Eye.
- 39 Friction Shaft Bearing.
- 40 Friction Shaft.
- 41 Break Drum for Motor Shaft.
- 42 Friction Drum for Worm Shaft.
- 43 Locking Clip for Motor Shaft Nut.
- 44 Drum Shaft.
- 45 Drum Shaft Thrust Collar.
- 46 Worm Shaft Nut and Washer.
- 47 Clip for Wire Rope.

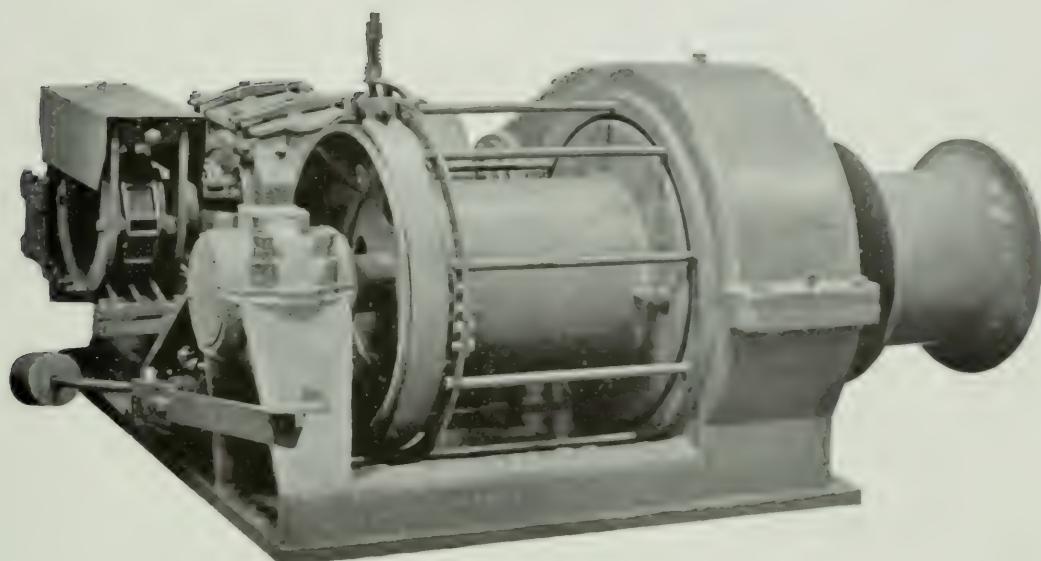
ELECTRIC CARGO WINCH

Worm Geared Type



ELECTRIC CARGO WINCH

Spur Geared Type

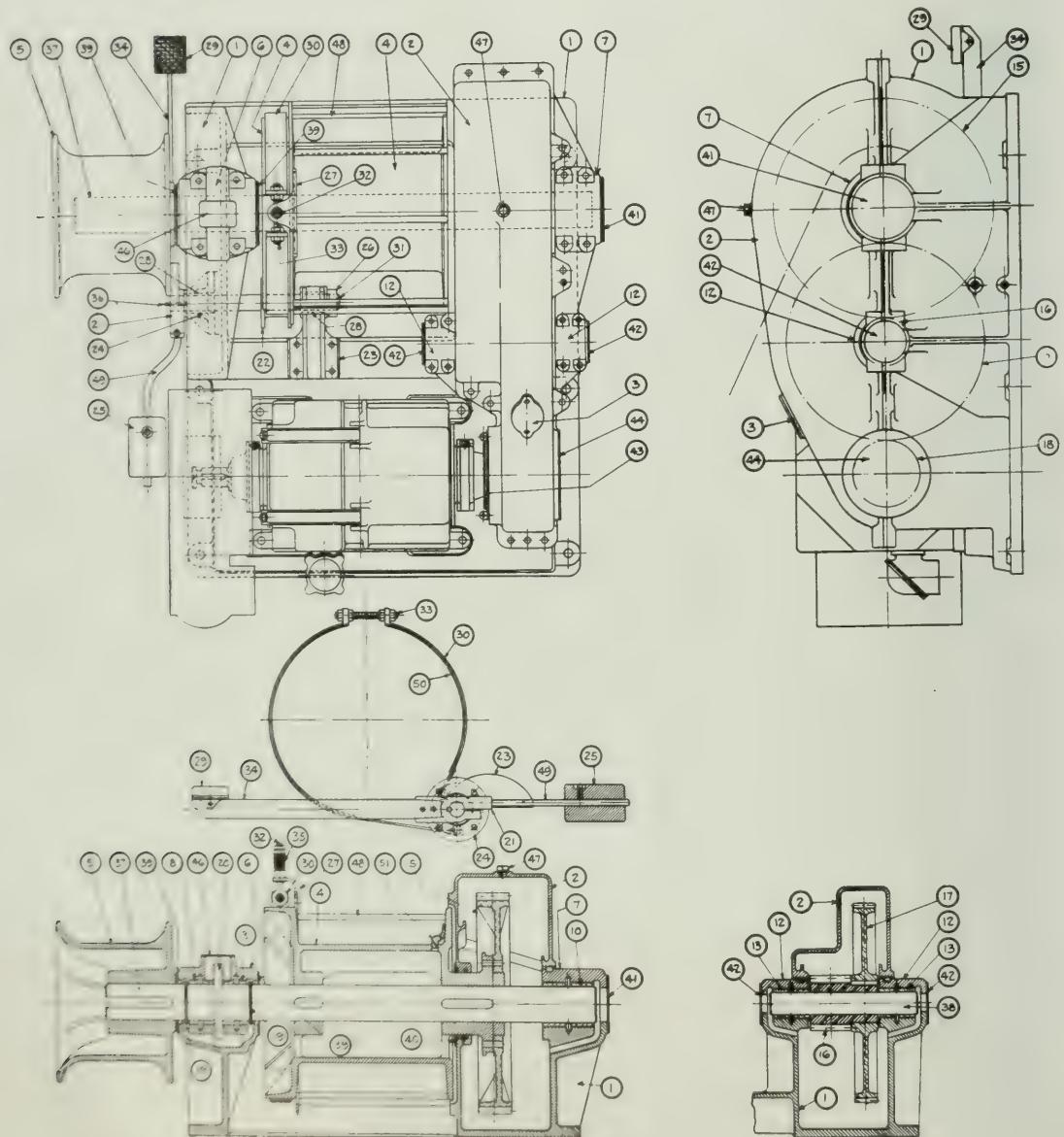


Winches of this type are installed on the new United Mail Line Steamships "ANTIQUA," "QUIRIGUA," "VERAGUA" and also the following: M.S. "COURAGEOUS," "DEFIANCE," "TRIUMPH," "CITY OF ELWOOD," "WARD," "POTTER," "NEW ORLEANS," "WICHITA" and "JEFF DAVIS." The winches are single drum, two gear reduction. The teeth of gearing are machine cut. Bearings are self-lubricated and the gearing is enclosed in oil-tight casing. The winches are made in three sizes, two, three and five-ton. The dimensions are given on page 10 and list of parts on pages 8 and 9.

Size	H.P.	Capacity-Pounds	Speed Rpm	Weight
2-Ton	25	1000 to 4000	330 to 200	3160
3-Ton	35	2000 to 6000	350 to 210	6750
5-Ton	50	2000 to 10000	325 to 150	9630

ELECTRIC CARGO WINCH

Spur Geared Type



ELECTRIC CARGO WINCH

Spur Geared Type

No. LIST OF PARTS

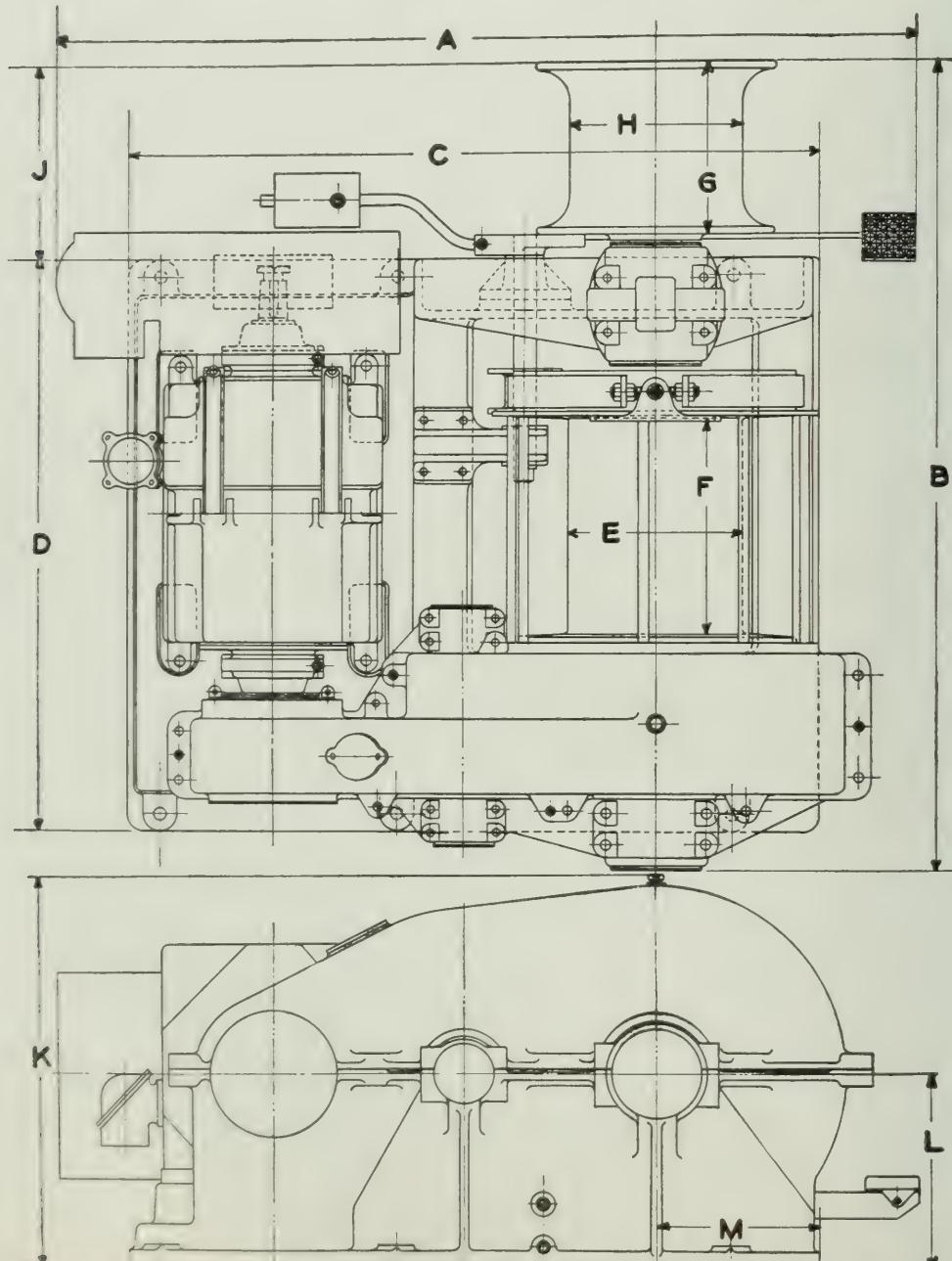
- 1 Bed, Frame and Gear Case.
- 2 Gear Casing Cover.
- 3 Hand Hole Cover.
- 4 Drum.
- 5 Head.
- 6 Drum Shaft Bearing Cap (Long).
- 7 Drum Shaft Bearing Cap (Short).
- 8 Drum Shaft Long Bearing Box (Inside) or (Outside).
- 9 Drum Shaft Long Bearing Box Liner
- 10 Drum Shaft Short Bearing Box.
- 11 Drum Shaft Short Bearing Box Liner.
- 12 Intermediate Shaft Bearing Cap
- 13 Intermediate Shaft Bearing Box
- 14 Intermediate Shaft Bearing Box Liner.
- 15 Main Spur Gear.
- 16 Main Spur Pinion.
- 17 Intermediate Spur Gear.
- 18 Motor Pinion.
- 19 Oil Flinger.
- 20 Split Oil Collar.
- 21 Foot Lever and Counter-weight Holder.
- 22 Friction Cam.
- 23 Friction Shaft Bearing (Inboard).
- 24 Friction Shaft Bearing (Outboard).
- 25 Counter-weight.

No. LIST OF PARTS

- 26 Friction Shaft Collar.
- 27 Friction Support.
- 28 Friction Bearing Bushing (Inboard) or (Outboard).
- 29 Friction Foot Lever Pedal.
- 30 Friction Band (2 Pieces).
- 31 Friction Shaft.
- 32 Friction Hanger Eye Bolt.
- 33 Friction Stud.
- 34 Friction Foot Lever.
- 35 Friction Spring.
- 36 Friction Shaft Special Key.
- 37 Drum Shaft.
- 38 Intermediate Shaft.
- 39 Drum Shaft Felt Retainer (2 Pieces).
- 40 Drum Shaft Felt Retainer (2 Pieces).
- 41 Drum Shaft Cover Plate.
- 42 Intermediate Shaft Cover Plate.
- 43 Motor Shaft Oil Retainer.
- 44 Motor Shaft Cover Plate.
- 45 Oil Wiper.
- 46 Oil Wiper Cover Plate.
- 47 Vent Plug.
- 48 Rope Guard.
- 49 Counter-weight Rod.
- 50 Friction Brake Lining.
- 51 Clip for Wire Rope.

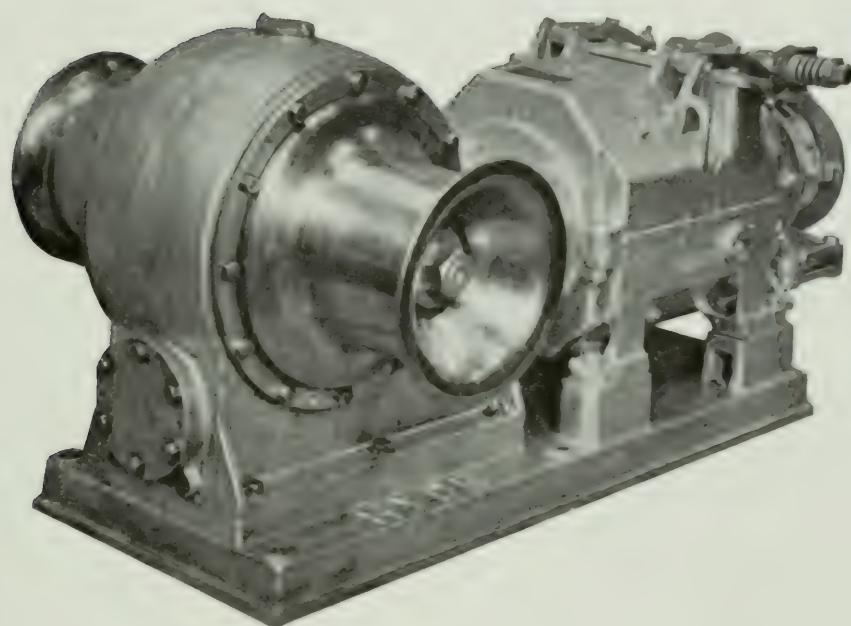
ELECTRIC CARGO WINCH

Spur Geared Type



ELECTRIC BOAT WINCH

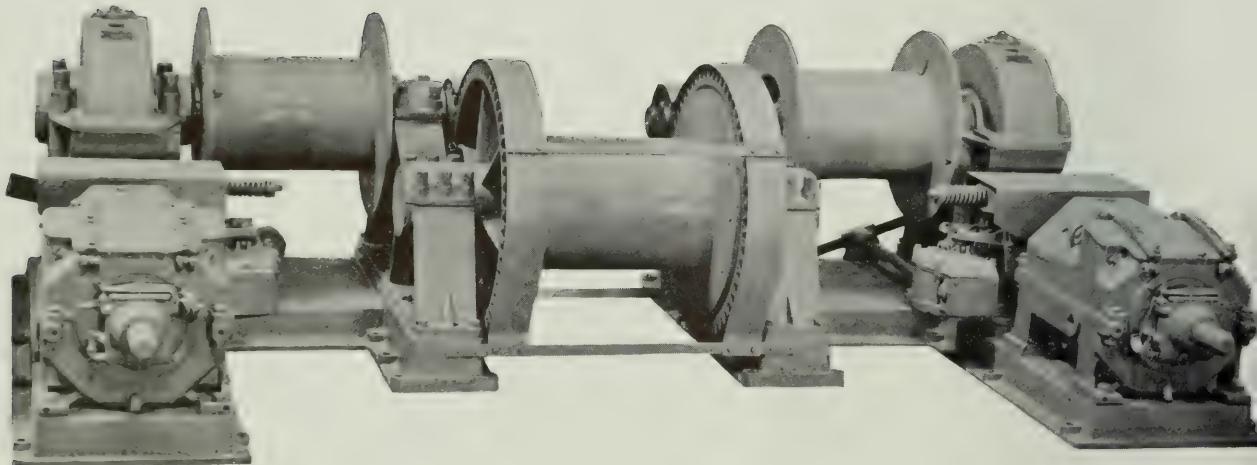
Worm Geared Type



H.P.	Diam. Gypsy	Capacity Pull Feet	Length	Breadth	Height	Weight	
5	6 ³ / ₄ "	1000	50	3' 10"	19 ¹ / ₂ "	20"	810
7 ¹ / ₂	6 ³ / ₄ "	1500	100	4' 2"	19 ¹ / ₂ "	20"	1085
10	10"	2000	100	4' 9"	36"	23"	1710
15	10"	2500	100	5' 1"	36"	29"	2200
20	12"	3300	100	5' 5"	36"	32"	2910
25	15"	5000	100	6' 3"	37' 6"	34"	3625

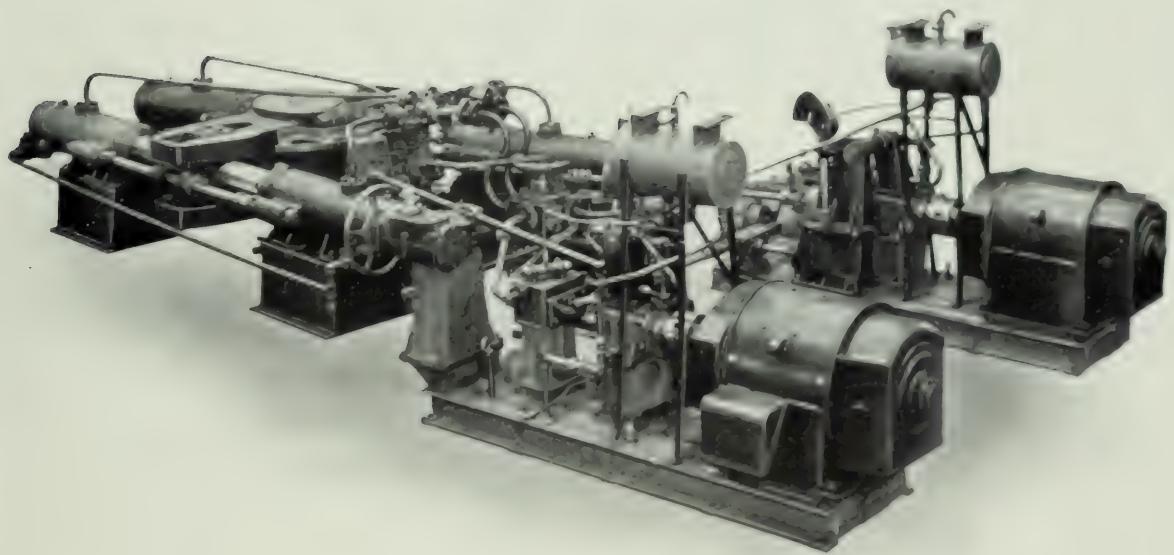
ELECTRIC CARGO WINCH

Worm Geared Type



Two fifty horsepower worm geared cargo winches geared to a large center drum for handling fifty-ton loads. Winches of this type are installed on the new Panama Mail S.S. "SANTA ROSA," "SANTA LUCIA," "SANTA PAULA" and "SANTA ELENA."

HYDE
HYDRO ELECTRIC
STEERING GEAR



HYDE WINDLASS COMPANY
BATH, MAINE

No. 22

HYDRO ELECTRIC STEERING GEAR

DESCRIPTION AND OPERATION

THE steering gear, illustrated on page 1 and shown on pages 3, 4 and 5 is an electric hydraulic type with full storage motion. It consists essentially of a power unit and plunger unit: all in the steering gear compartment.

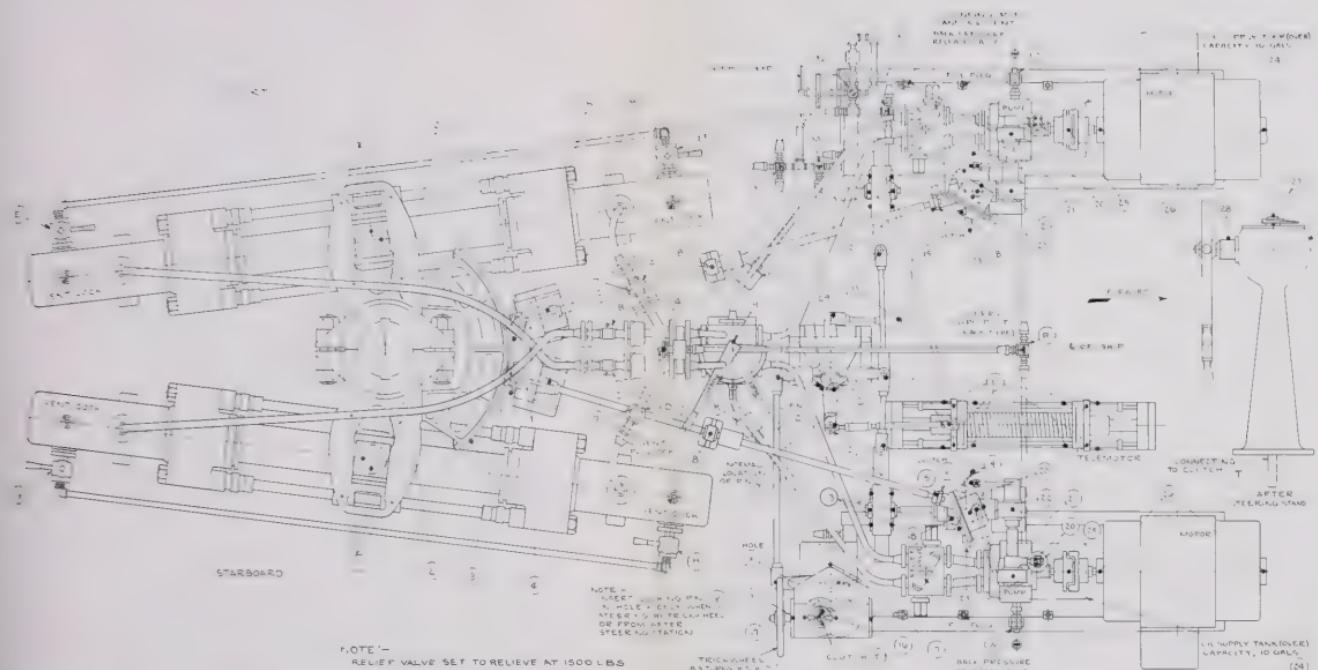
The power unit has a dual pumping system, each consisting of a constant speed motor driving a Waterbury variable stroke pump. The two pumps are connected to a six-way plug cock which is in turn connected through tubing to the plunger unit through a relief valve. This cock operated by a lever allows either the starboard or port power unit to be used.

The plunger unit consists of two plungers and four cylinders mounted in fore and aft directions. The tiller on rudder stock is located between the rams and is fitted with sliding blocks.

OPERATING

Steering is accomplished by any one of three means: Sperry — telemotor — or trickwheel.

1. Before starting either power unit, check steerer to see that vent plug cock is in the closed position (V) and that power transfer valve indicates the selected power unit. Also see that the cylinder cut out valves (A) (B) (C) (D) are open and drain or by-pass valves (E) (F) (G) (H) and pump drain valves (S) (W) are closed.
2. To use either port or starboard power unit, put transfer valve lever to side selected and start corresponding motor.
3. To change from one power unit to the other, start other motor and when steering gear is in a followed-up position, throw transfer lever to other side.
4. For steering by trickwheel or from after steering station, remove locking pin (Y) from its normal location in telemotor lever and insert in hole (X). Clutch (T) at vertical shaft to be engaged only when steering from after steering station.
5. Remove pin (Y) from hole (X) and replace in normal location when returning to "Sperry" gyro control.
6. Clutches (U) and (V) are to be disengaged only in case of casualty to follow-up mechanism.
7. The rudder can be locked at any angle of its travel by moving transfer valve to position marked "Lock" and inserting pin (Z).



LUBRICATING INSTRUCTIONS

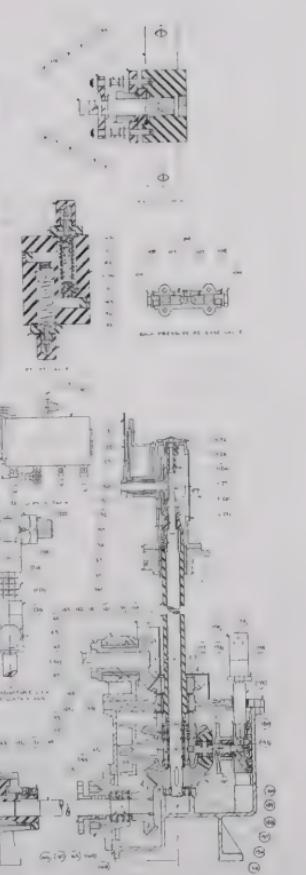
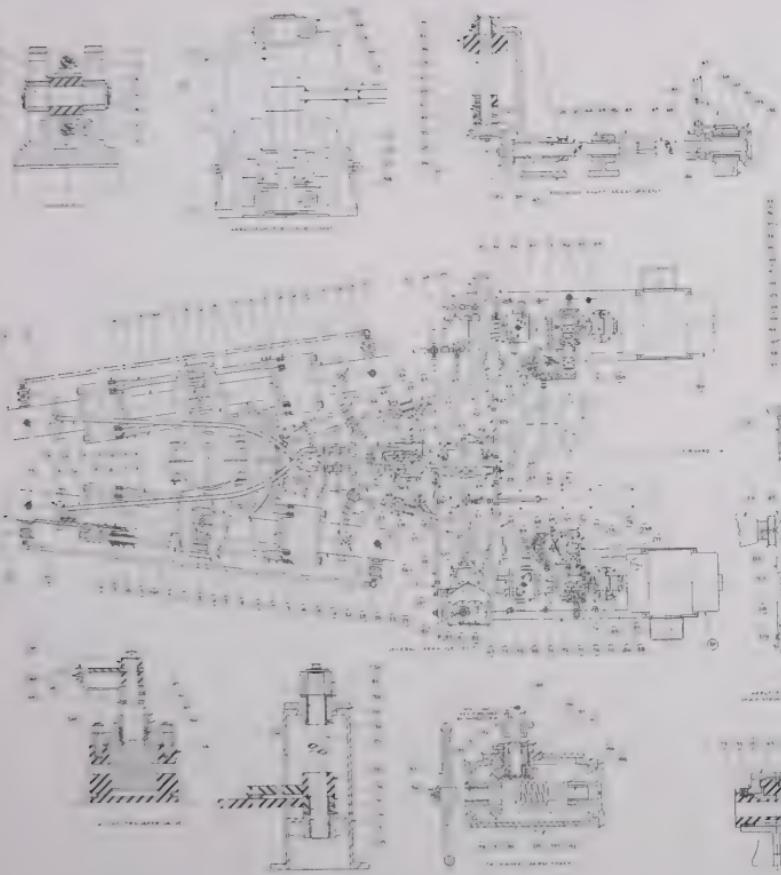
SYMBOL • INDICATES THAT PLACE OF APPLICATION IS TO BE SEEN IN VIEW SO MARKED
SYMBOL - INDICATES THAT PLACE OF APPLICATION IS NOT TO BE SEEN IN VIEW SO MARKED, BUT IS ACCESSIBLE AND UNDER

FILLING.

1. Open vent plug cock (located over cylinder cutout valves) the stem position (A) indicates open, and (V) indicates closed.
2. Open cylinder vent cocks.
3. Check cylinder cutout valves (A) (B) (C) (D) to see that they are open.
4. Check cylinder drain and by-pass valves (E) (F) (G) (H) to see that they are tightly closed. The handles of these valves should be removed to avoid accidental opening.
5. Move transfer valve lever to position indicating selection of either port or starboard unit and start filling the system.
6. When oil appears at the cylinder vent cocks, close them and watch supply tank oil level indicator.
7. When oil appears at supply tank, throw power unit transfer valve lever to other power unit and continue filling until both supply tanks are about $\frac{3}{4}$ full. Keep supply tanks about $\frac{3}{4}$ full, taking care to prevent foreign matter from entering the system. In case of casualty to one of the supply tanks, the faulty tank may be cut out and the other tank used exclusively by means of plug cock (R).
8. The supply tanks may be filled by means of the hand pump from the bedplate tanks, plug cock (P) controlling the discharge to both tanks, or either tank separately. The oil filter should always be used when filling supply tanks by hand pump, or when filling cylinders by hand pump.

VALVE AND COCK INSTRUCTIONS

CARE MUST BE TAKEN TO ASSURE PROPER POSITIONS
OF VALVES AND COCKS BEFORE ANY OPERATION IS STARTED

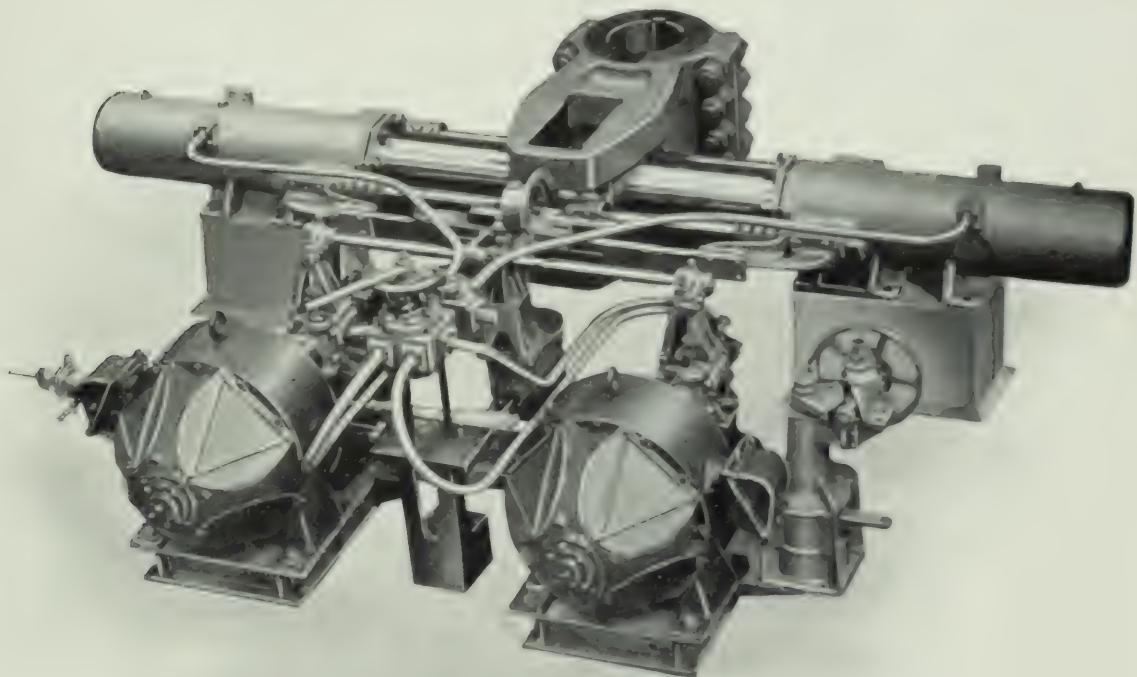


**LIST OF PARTS
STEERER ILLUSTRATED PAGE 1**

1	TYLER HALF
2	TYLER HALF
3	TOP PLUNGER PIN CAP
4	BOTTOM PLUNGER PIN CAP
5	PLUNGER PIN
6	TOP TYLER BLOCK
7	BOTTOM TYLER BLOCK
8	TYLER GUIDE AND TOP
9	TYE ROD
10	BUSHING
11	TYE ROD BUSHING
12	FOLLOW UP LEVATOR
13	FLANGED STOP
14	FRUSTRATING PIECE
15	FRUSTRATING PIECE RETA NER
16	SPLIT COLLAR
17	PACKING GLAND
18	TYE ROD BUSHING
19	BUNNING
20	CYLINDER
21	TYE ROD
22	CYLINDER DRAIN VALVE
23	PLUG AND AIR COCK
24	PIPE
25	PIPE
26	PIPE
27	PIPE
28	PIPE
29	PIPE
30	PIPE
31	REDUCING LATERAL CO
32	REDUCING LATERAL
33	TYE ROD COCK
34	FLANGE
35	FLANGE
36	PIPE
37	PIPE
38	6 WAY TRANSFER VALVE
39	PIPE
40	PIPE
41	PIPE
42	FOLLOW UP PINION BEARING CAP
43	FOLLOW UP PINION BEARING
44	MITER GEAR SHAFT
45	FOLLOW UP SHAFT
46	TYE ROD FLANGE
47	LINK PIN
48	FOLLOW UP SHAFT INTERMEDIATE BEARING
49	TYE ROD GEAR
50	KNUCKLE R H THD
51	KNUCKLE R H THD
52	KNUCKLE L H THD
53	KNUCKLE L H THD
54	CONN LINK ROD
55	CONN LINK ROD
56	CONN LINK ROD
57	KNUCKLE L H THD
58	KNUCKLE R H THD
59	CENTRAL CONTROL STAND
60	LINK PIN
61	TELEMOTOR BEADPLATE (SEE TELEMOTOR LIST OF PARTS)
62	CONTROL RACK
63	CONTROL RACK STAND COVER
64	HAND PUMP DEMING NO 1
65	OIL FILTER CUNO
66	CLUTCH
67	CLUTCH LEVER
68	CLUTCH LEVER BEARING
69	CONTROL RACK
70	DIFFERENTIAL LEVER
71	PUMP CONTROL SHAFT - PORT
72	PUMP CONTROL SHAFT - STANDBOARD
73	CONTROL SHAFT BEARING
74	CONTROL SHAFT BEARING CAP
75	BEARING BOX
76	PUMP CONTROL SHAFT BEARING
77	PUMP CONTROL SHAFT BEARING
78	BEARING BOX
79	TYE ROD
80	PORT MOTOR
81	STARBOARD MOTOR
82	WATER MOTOR
83	TRICKWHEEL
84	RELIEF VALVE BODY

**LIST OF PARTS
Continued**

85	FLUX HUE BLOCK, UPPER
86	COUPLING HALF - PUMP END
87	COUPLING HALF - MOTOR END
88	COUPLING HALF, MOTOR END
89	BACK PRESSURE RELEASE VALVE BODY
90	HYDRAULIC CYLINDER
91	HYDRAULIC SECTOR CASING COVER
92	PORT BEADPLATE
93	PARKBOARD BEADPLATE
94	VALVE BODY
95	ADJUSTING SCREW CAP
96	ADJUSTING SCREW
97	ADJUSTING SCREW
98	RELIEF VALVE COVER
99	GASOLINE VALVE
100	LEAF VALVE SPRING
101	VALVE SPRING SEAT, VALVE END
102	RELIEF VALVE SEAT
103	RELIEF VALVE
104	RELIEF VALVE
105	VALVE SPRING SEAT, SCREW END
106	VALVE SPRING
107	SHUTTLE VALVE
108	GASKET
109	HYDRAULIC TANK VENT PLUG
110	OIL LEVEL INDICATOR, GITS BROS
111	STUFFING BOX
112	STUFFING PLUG STANCHION
113	YORE
114	COLLAR
115	COLLAR
116	SCREW PIN
117	SQUARE HEAD PIN KEY
118	GLAND
119	FLANGE RING
120	GASKET
121	INDICATOR SCALE
122	INDICATOR
123	ROD JODDER
124	ROD JODDER
125	ROD JODDER
126	HELM INDICATOR PINION
127	DIFF. CONTROL SHAFT EXTENSION
128	CYLINDER BUSHING
129	COVER
130	HELM INDICATOR GEAR
131	HELM INDICATOR GEAR
132	BUSHING
133	RUDDER INDICATOR PINION
134	RUDDER INDICATOR ROD AND RUDDER INDICATOR STAND
135	BUSHING
136	BUSHING
137	DIFF. CONTROL SHAFT BEARING
138	DIFF. FOLLOW UP CONTROL SLEEVE
139	DIFF. CONTROL GEAR GUARD
140	DIFF. CONTROL METER GEAR
141	FOLLOW UP METER GEAR BEARING CAP
142	BEARING BOX
143	FOLLOW UP METER GEAR CLUTCH HALF
144	FOLLOW UP METER GEAR BEARING
145	BEVEL PINION
146	BEVEL PINION
147	COLLAR
148	BEVEL GEAR
149	BEVEL GEAR
150	BALL BEARING S/N NO. 6205
151	BALL BEARING S/N NO. 6205
152	BALL BEARING S/N NO. 6205
153	DISPANCE PIECE
154	DISPANCE PIECE
155	PUMP CONTROL ROLLER RACE
156	PUMP CONTROL ROLLER RACE
157	DISPANCE PIECE
158	MITER AND BEVEL GEAR
159	MITER AND BEVEL GEAR
160	ROLLER BEARING AND PIN
161	DIFFERENTIAL PINION PIN
162	TYE ROD
163	TYE ROD
164	DISPANCE PIECE
165	DISPANCE PIECE
166	DISPANCE PIECE
167	DISPANCE PIECE
168	DISPANCE PIECE
169	DISPANCE PIECE
170	DISPANCE PIECE
171	DISPANCE PIECE
172	DISPANCE PIECE
173	DISPANCE PIECE
174	DISPANCE PIECE
175	DISPANCE PIECE
176	DISPANCE PIECE
177	DISPANCE PIECE
178	DISPANCE PIECE
179	DISPANCE PIECE
180	DISPANCE PIECE
181	DISPANCE PIECE
182	DISPANCE PIECE
183	DISPANCE PIECE
184	DISPANCE PIECE
185	DISPANCE PIECE
186	DISPANCE PIECE
187	DISPANCE PIECE
188	DISPANCE PIECE
189	DISPANCE PIECE
190	DISPANCE PIECE
191	DISPANCE PIECE
192	DISPANCE PIECE
193	DISPANCE PIECE
194	DISPANCE PIECE
195	DISPANCE PIECE
196	DISPANCE PIECE
197	DISPANCE PIECE
198	DISPANCE PIECE
199	DISPANCE PIECE
200	DISPANCE PIECE
201	DISPANCE PIECE
202	DISPANCE PIECE
203	DISPANCE PIECE
204	DISPANCE PIECE
205	DISPANCE PIECE
206	DISPANCE PIECE
207	DISPANCE PIECE
208	DISPANCE PIECE
209	DISPANCE PIECE
210	DISPANCE PIECE
211	DISPANCE PIECE
212	DISPANCE PIECE
213	DISPANCE PIECE
214	DISPANCE PIECE
215	DISPANCE PIECE
216	DISPANCE PIECE
217	DISPANCE PIECE
218	DISPANCE PIECE
219	DISPANCE PIECE
220	DISPANCE PIECE
221	DISPANCE PIECE
222	DISPANCE PIECE
223	DISPANCE PIECE
224	DISPANCE PIECE
225	DISPANCE PIECE
226	DISPANCE PIECE
227	DISPANCE PIECE
228	DISPANCE PIECE
229	DISPANCE PIECE
230	DISPANCE PIECE
231	DISPANCE PIECE
232	DISPANCE PIECE
233	DISPANCE PIECE
234	DISPANCE PIECE
235	DISPANCE PIECE
236	DISPANCE PIECE
237	DISPANCE PIECE
238	DISPANCE PIECE
239	DISPANCE PIECE
240	DISPANCE PIECE
241	DISPANCE PIECE
242	DISPANCE PIECE
243	DISPANCE PIECE
244	DISPANCE PIECE
245	DISPANCE PIECE
246	DISPANCE PIECE
247	DISPANCE PIECE
248	DISPANCE PIECE
249	DISPANCE PIECE
250	DISPANCE PIECE
251	DISPANCE PIECE
252	DISPANCE PIECE
253	DISPANCE PIECE
254	DISPANCE PIECE
255	DISPANCE PIECE
256	DISPANCE PIECE
257	DISPANCE PIECE
258	DISPANCE PIECE
259	DISPANCE PIECE
260	DISPANCE PIECE
261	DISPANCE PIECE
262	DISPANCE PIECE
263	DISPANCE PIECE
264	DISPANCE PIECE
265	DISPANCE PIECE
266	DISPANCE PIECE
267	DISPANCE PIECE
268	DISPANCE PIECE
269	DISPANCE PIECE
270	DISPANCE PIECE
271	DISPANCE PIECE
272	DISPANCE PIECE
273	DISPANCE PIECE
274	DISPANCE PIECE
275	DISPANCE PIECE
276	DISPANCE PIECE
277	DISPANCE PIECE
278	DISPANCE PIECE
279	DISPANCE PIECE
280	DISPANCE PIECE
281	DISPANCE PIECE
282	DISPANCE PIECE
283	DISPANCE PIECE
284	DISPANCE PIECE
285	DISPANCE PIECE
286	DISPANCE PIECE
287	DISPANCE PIECE
288	DISPANCE PIECE
289	DISPANCE PIECE
290	DISPANCE PIECE
291	DISPANCE PIECE
292	DISPANCE PIECE
293	DISPANCE PIECE
294	DISPANCE PIECE
295	DISPANCE PIECE
296	DISPANCE PIECE
297	DISPANCE PIECE
298	DISPANCE PIECE
299	DISPANCE PIECE
300	DISPANCE PIECE
301	DISPANCE PIECE
302	DISPANCE PIECE
303	DISPANCE PIECE
304	DISPANCE PIECE
305	DISPANCE PIECE
306	DISPANCE PIECE
307	DISPANCE PIECE
308	DISPANCE PIECE
309	DISPANCE PIECE
310	DISPANCE PIECE
311	DISPANCE PIECE
312	DISPANCE PIECE
313	DISPANCE PIECE
314	DISPANCE PIECE
315	DISPANCE PIECE
316	DISPANCE PIECE
317	DISPANCE PIECE
318	DISPANCE PIECE
319	DISPANCE PIECE
320	DISPANCE PIECE
321	DISPANCE PIECE
322	DISPANCE PIECE
323	DISPANCE PIECE
324	DISPANCE PIECE
325	DISPANCE PIECE
326	DISPANCE PIECE
327	DISPANCE PIECE
328	DISPANCE PIECE
329	DISPANCE PIECE
330	DISPANCE PIECE
331	DISPANCE PIECE
332	DISPANCE PIECE
333	DISPANCE PIECE
334	DISPANCE PIECE
335	DISPANCE PIECE
336	DISPANCE PIECE
337	DISPANCE PIECE
338	DISPANCE PIECE
339	DISPANCE PIECE
340	DISPANCE PIECE
341	DISPANCE PIECE
342	DISPANCE PIECE
343	DISPANCE PIECE
344	DISPANCE PIECE
345	DISPANCE PIECE
346	DISPANCE PIECE
347	DISPANCE PIECE
348	DISPANCE PIECE
349	DISPANCE PIECE
350	DISPANCE PIECE
351	DISPANCE PIECE
352	DISPANCE PIECE
353	DISPANCE PIECE
354	DISPANCE PIECE
355	DISPANCE PIECE
356	DISPANCE PIECE
357	DISPANCE PIECE
358	DISPANCE PIECE
359	DISPANCE PIECE
360	DISPANCE PIECE
361	DISPANCE PIECE
362	DISPANCE PIECE
363	DISPANCE PIECE
364	DISPANCE PIECE
365	DISPANCE PIECE
366	DISPANCE PIECE
367	DISPANCE PIECE
368	DISPANCE PIECE
369	DISPANCE PIECE
370	DISPANCE PIECE
371	DISPANCE PIECE
372	DISPANCE PIECE
373	DISPANCE PIECE
374	DISPANCE PIECE
375	DISPANCE PIECE
376	DISPANCE PIECE
377	DISPANCE PIECE
378	DISPANCE PIECE
379	DISPANCE PIECE
380	DISPANCE PIECE
381	DISPANCE PIECE
382	DISPANCE PIECE
383	DISPANCE PIECE
384	DISPANCE PIECE
385	DISPANCE PIECE
386	DISPANCE PIECE
387	DISPANCE PIECE
388	DISPANCE PIECE
389	DISPANCE PIECE
390	DISPANCE PIECE
391	DISPANCE PIECE
392	DISPANCE PIECE
393	DISPANCE PIECE
394	DISPANCE PIECE
395	DISPANCE PIECE
396	DISPANCE PIECE
397	DISPANCE PIECE
398	DISPANCE PIECE
399	DISPANCE PIECE
400	DISPANCE PIECE
401	DISPANCE PIECE
402	DISPANCE PIECE
403	DISPANCE PIECE
404	DISPANCE PIECE
405	DISPANCE PIECE
406	DISPANCE PIECE
407	DISPANCE PIECE
408	DISPANCE PIECE
409	DISPANCE PIECE
410	DISPANCE PIECE
411	DISPANCE PIECE
412	DISPANCE PIECE
413	DISPANCE PIECE
414	DISPANCE PIECE
415	DISPANCE PIECE
416	DISPANCE PIECE
417	DISPANCE PIECE
418	DISPANCE PIECE
419	DISPANCE PIECE
420	DISPANCE PIECE
421	DISPANCE PIECE
422	DISPANCE PIECE
423	DISPANCE PIECE
424	DISPANCE PIECE
425	DISPANCE PIECE
426	DISPANCE PIECE
427	DISPANCE PIECE
428	DISPANCE PIECE
429	DISPANCE PIECE
430	DISPANCE PIECE
431	DISPANCE PIECE
432	DISPANCE PIECE
433	DISPANCE PIECE
434	DISPANCE PIECE
435	DISPANCE PIECE
436	DISPANCE PIECE
437	DISPANCE PIECE
438	DISPANCE PIECE
439	DISPANCE PIECE
440	DISPANCE PIECE
441	DISPANCE PIECE
442	DISPANCE PIECE
443	DISPANCE PIECE
444	DISPANCE PIECE
445	DISPANCE PIECE
446	DISPANCE PIECE
447	DISPANCE PIECE
448	DISPANCE PIECE
449	DISPANCE PIECE
450	DISPANCE PIECE
451	DISPANCE PIECE
452	DISPANCE PIECE
453	DISPANCE PIECE
454	DISPANCE PIECE
455	DISPANCE PIECE
456	DISPANCE PIECE
457	DISPANCE PIECE
458	DISPANCE PIECE
459	DISPANCE PIECE
460	DISPANCE PIECE
461	DISPANCE PIECE
462	DISPANCE PIECE
463	DISPANCE PIECE
464	DISPANCE PIECE
465	DISPANCE PIECE
466	DISPANCE PIECE
467	DISPANCE PIECE
468	DISPANCE PIECE
469	DISPANCE PIECE
470	DISPANCE PIECE
471	DISPANCE PIECE
472	DISPANCE PIECE
473	DISPANCE PIECE
474	DISPANCE PIECE
475	DISPANCE PIECE
476	DISPANCE PIECE
477	DISPANCE PIECE
478	DISPANCE PIECE
479	DISPANCE PIECE
480	DISPANCE PIECE
481	DISPANCE PIECE
482	DISPANCE PIECE
483	DISPANCE PIECE
484	DISPANCE PIECE
485	DISPANCE PIECE
486	DISPANCE PIECE
487	DISPANCE PIECE
488	DISPANCE PIECE
489	DISPANCE PIECE
490	DISPANCE PIECE
491	DISPANCE PIECE
492	DISPANCE PIECE
493	DISPANCE PIECE
494	DISPANCE PIECE
495	DISPANCE PIECE
496	DISPANCE PIECE
497	DISPANCE PIECE
498	DISPANCE PIECE
499	DISPANCE PIECE
500	DISPANCE PIECE



TWO CYLINDER TYPE HYDRO ELECTRIC STEERING GEAR

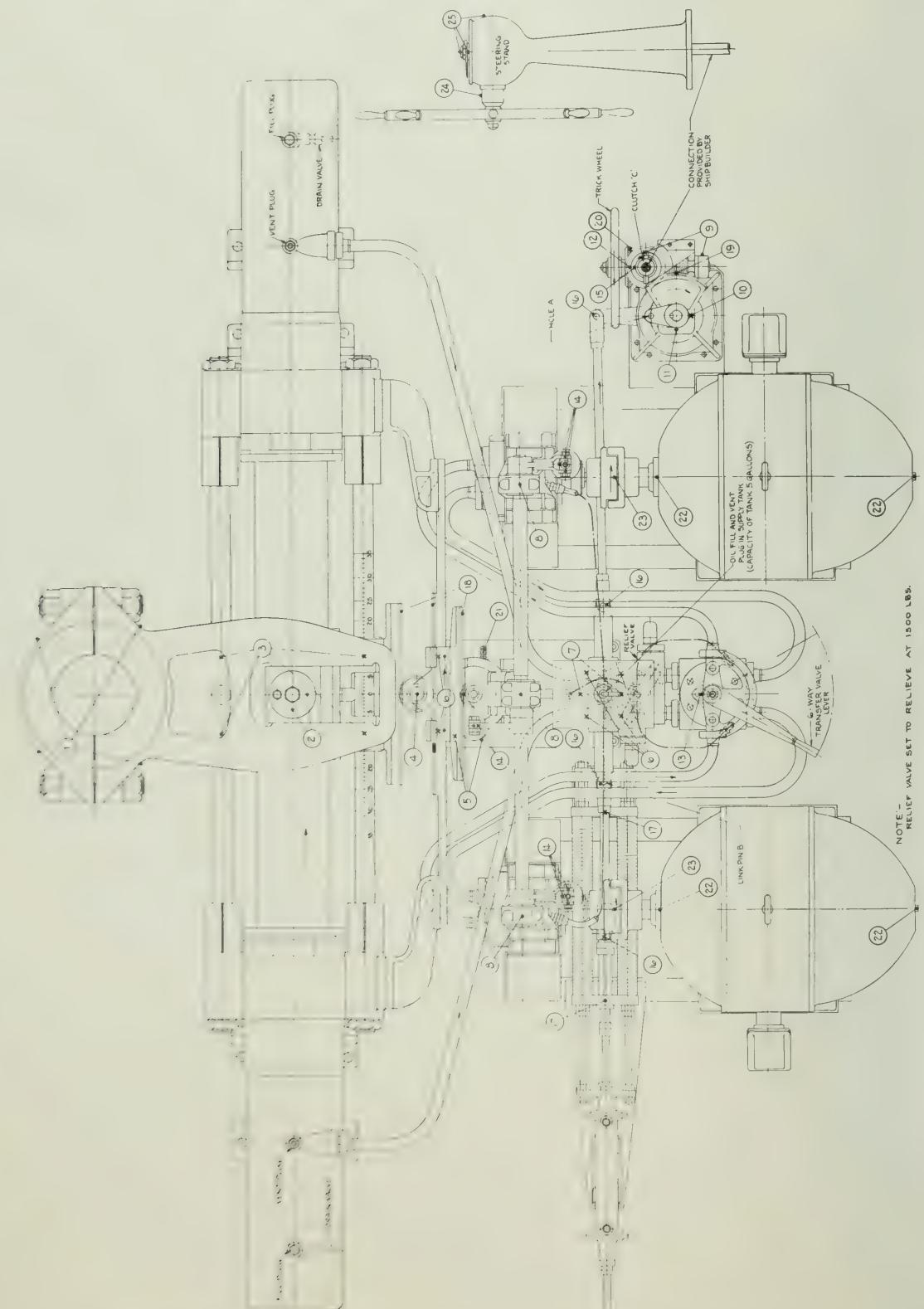
The power unit consists of two motors driving two Waterbury pumps at constant speed with a six-way valve cock interposed in the piping between pump and ram cylinders. This six-way cock is lever operated and serves as a means of changing over from one pumping unit to the other, also allows for by-passing the liquid from one cylinder to the other in case the emergency steering gear is to be used.

The ram unit consists of a double ended ram and two cylinders, connecting to a forked tiller with sliding blocks to forged pin in center of ram.

A relief valve is located in the piping between the six-way cock and plunger cylinders. This relief valve is set to release at 1500 lbs. per square inch and relieves to low pressure side of line.

The Hydraulic Telemotor is used to control the direction and angular travel of the rudder through Steering Gear. The Telemotor Receiver is connected through a differential to stroke the pump. Then mechanism from tiller or ram through differential returns stroke of pump to neutral position.

HYDRO ELECTRIC STEERING GEAR



INSTRUCTIONS FOR STEERER ILLUSTRATED ON PAGE 9 AND SHOWN ON PAGE 10

1. To fill the cylinders, remove vent and fill plugs. Remainder of hydraulic system to be filled by removal of oil plug in top of supply tank. When filling through supply tank, the transfer valve lever should be to starboard for filling starboard pump and to port for filling port pump.

2. Keep oil supply tank three-fourths full. Care is to be taken to prevent foreign matter from entering system.

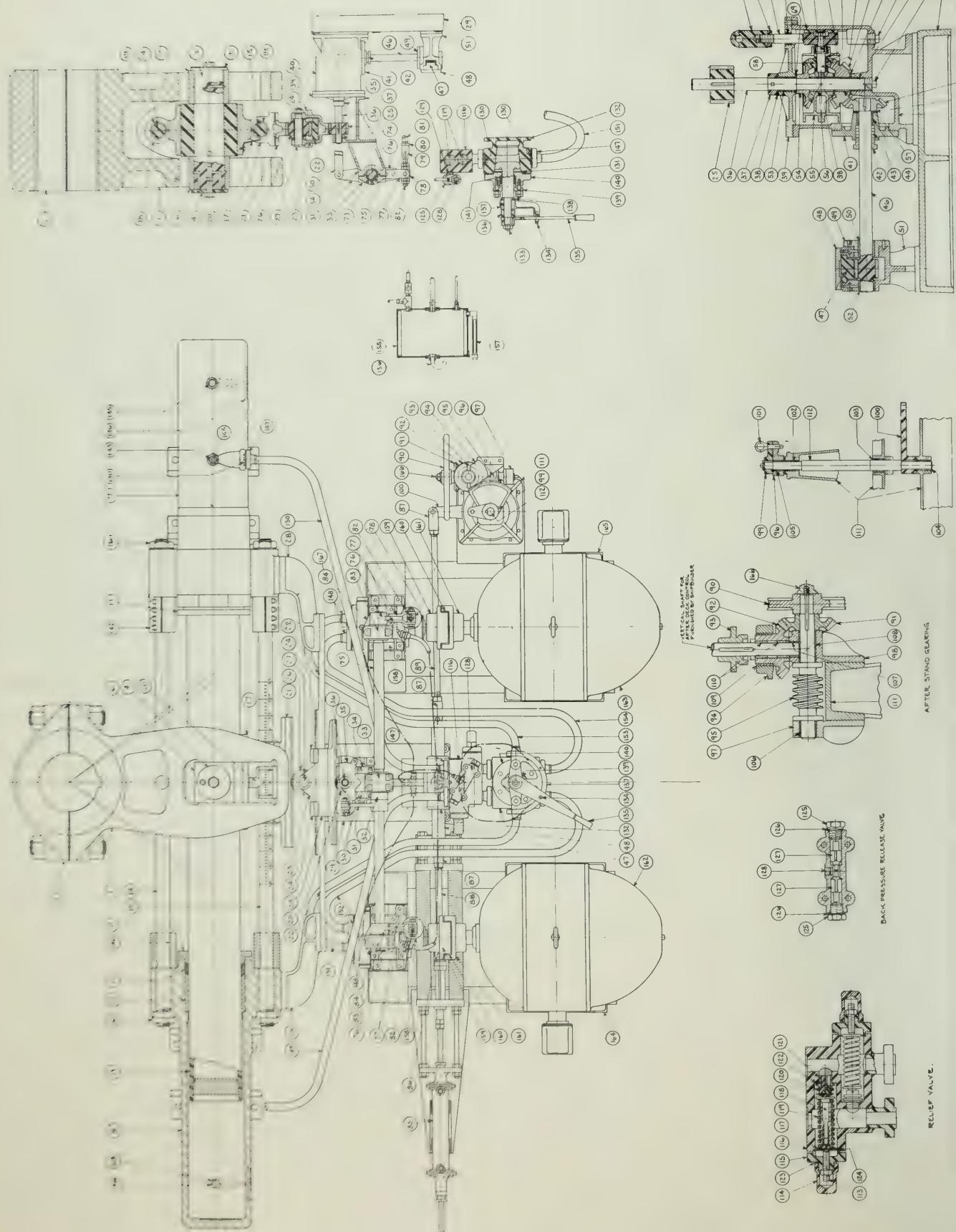
3. Handles of cylinder drain valves should be removed to prevent accidental opening.

4. Telemotor control is used for normal steering. (See tele-motor instructions.)

LUBRICATION INSTRUCTIONS

Symbol  indicates that place of application may be seen in view so marked.
Symbol  indicates that place of application is not in sight in view so marked but is accessible and under .

Symbol	Part Lubricated	No. Place	Method	Lubricant	Application
1	Vertical Seal Bearings	1	Oil Case	SAE No. 20	Daily service
2	Telemotor Link Pins	4			
3	Hydromotor Pump Rod	2			
4	Fold-up Rods	3	Wash	Castor Grease	
5	Transfer Worm and Sector	1			
6	Friction Meter Gear	1		Oil No. 40	Keep to one side when not in use and daily service
7	Directional Gear Housing	1	F.C.	General Grade	Work
8	Motor Box Bearings	4	Pressure	Hydraulic Power Fluid	Replaces Friction power fluid, when used
9	Friction Worm	2	Reefed with Axle Lubricant		
10	Friction Wheel Shaft Bearings	1	Oil Cup	Oil SAE No. 20	Daily service
11	Friction Wheel Shaft Bearings	2	Oil Cup		
12	Steering Stand	4	Oil Case		
13	Steering Stand	4	Oil Case		
14	Hydromotor System	1	Oil	SAE No. 20	Keep to one side when not in use
15	Hydromotor System	8	Oil	SAE No. 20	Daily service
16	Hydromotor System	8	Oil	SAE No. 20	Daily service
17	Hydromotor System	8	Oil	SAE No. 20	Daily service
18	Hydromotor System	8	Oil	SAE No. 20	Daily service
19	Hydromotor System	8	Oil	SAE No. 20	Daily service
20	Hydromotor System	8	Oil	SAE No. 20	Daily service
21	Hydromotor System	8	Oil	SAE No. 20	Daily service
22	Hydromotor System	8	Oil	SAE No. 20	Daily service
23	Hydromotor System	8	Oil	SAE No. 20	Daily service
24	Steering Stand	1	Oil Cup	Oil SAE No. 20	Daily service
25	Steering Stand	1	Oil Cup	Oil SAE No. 20	Daily service
26	Hydromotor System	8	Oil	SAE No. 20	Daily service
27	Hydromotor System	8	Oil	SAE No. 20	Daily service
28	Hydromotor System	8	Oil	SAE No. 20	Daily service
29	Hydromotor System	8	Oil	SAE No. 20	Daily service
30	Hydromotor System	8	Oil	SAE No. 20	Daily service



LIST OF PARTS FOR CUT PAGE 12

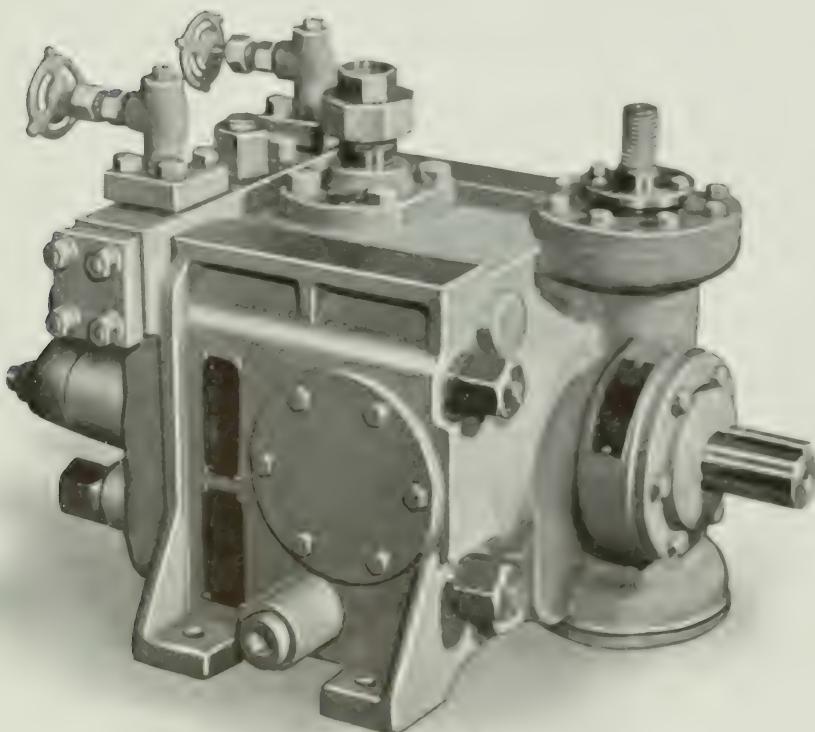
1. TILLER	57. BUSHING	113. ADJUSTING SCREW, RELIEF VALVE
2. TILLER CAP	58. DIFFERENTIAL PINION	114. ADJUSTING SCREW
3. PLUNGER PIN	59. DIFFERENTIAL CONTROL ROD KNUCKLE	115. RELIEF VALVE COVER
4. PLUNGER PIN CAP, TOP	60. LOCKNUT	116. RELIEF VALVE BODY
5. PLUNGER PIN CAP, BOTTOM	61. DIFFERENTIAL CONTROL SPINDLE	117. VALVE SPRING SEAT
6. TILLER BLOCK	62. BUSHING	118. VALVE SPRING SEAT
7. TILLER BLOCK	63. KEY	119. VALVE SPRING
8. STARBOARD CYLINDER	64. ROLLER BEARING AND PIN	120. RELIEF VALVE
9. PORT CYLINDER	65. BUSHING	121. RELIEF VALVE SEAT
10. CYLINDER BUSHING	66. BUSHING	122. GASKET
11. CYLINDER GLAND	67. DIFFERENTIAL PINION PIN	123. GASKET
12. CYLINDER PACKING	68. DOUBLE BEVEL GEAR	124. GASKET
13. PLUNGER	69. THRUST COLLAR	125. SPECIAL PLUG
14. TIE ROD AFT	70. PLUG	126. GASKET
15. TIE ROD FORWARD	71. BUSHING	127. BACK PRESSURE RELEASE VALVE
16. TIE ROD NUT	72. MITRE GEAR	128. BACK PRESSURE RELEASE VALVE BODY
17. TIE ROD BEARING FORWARD	73. BEARING BOX	129. GASKET
18. TIE ROD BEARING AFT	74. BUSHING	130. GASKET
19. TIE ROD BEARING BUSHING	75. PUMP CONTROL SHAFT	131. GASKET
20. RUDDER ANGLE POINTEN	76. PUMP CONTROL LEVER	132. 6-WAY TRANSFER VALVE BODY
21. FOLLOW-UP RACK	77. PUMP CONTROL LEVER. BLOCK END	133. 6-WAY TRANSFER VALVE PLUG
22. FIXED RACK	78. PUMP CONTROL LEVER. BLOCK	134. LOCKING PIN
23. DIFFERENTIAL RACK	79. PUMP ROD CONTROL KNUCKLE	135. TRANSFER VALVE LEVER
24. DIFFERENTIAL RACK COVER	80. LOCKNUT	136. DISTANCE PIECE
25. DIFFERENTIAL RACK PINION	81. PUMP STROKE CONTROL ROD	137. YOKE
26. FOLLOW-UP RACK PINION	82. ADJUSTING BOLT	138. COLLAR
27. FOLLOW-UP PINION PIN	83. BEARING CAP	139. GLAND
28. FIXED RACK BRACKET	84. BEARING	140. COVER AND STUFFING BOX
29. CONTROL UPLATE	85. TELEMOTOR	141. PACKING
30. CONTROL UPLATE	86. KNUCKLE	142. SPLIT COLLAR, 2 PIECES
31. DIFFERENTIAL RACK LEVER	87. KNUCKLE	143. VENT PLUG
32. DISTANCE PIECE	88. CONNECTING LINK	144. AIR COCK
33. CONTROL SHAFT BEARING CAP	89. CONNECTING LINK	145. PRESSURE GAUGE ADAPTER
34. CONTROL SHAFT BEARING	90. 18" STEERING WHEEL	146. DRAIN VALVE
35. CONTROL SHAFT BEARING BRACKET	91. MITRE GEAR	147. PIPE FLANGE
36. DIFFERENTIAL CONTROL SHAFT	92. MITRE GEAR	148. PIPE FLANGE
37. COLLAR	93. CLUTCH	149. PIPE
38. THRENT COLLAR	94. MITRE GEAR BEARING	150. PIPE
39. DIFFERENTIAL GEAR HOUSINGS COVER	95. WORM AND SHAFT	151. PIPE
40. DIFFERENTIAL GEAR HOUSINGS	96. WORM SCTOR	152. PIPE
41. BEARING AND STUFFING BOX	97. WORM SHAFT BEARING, SHORT	153. PIPE
42. GASKET	98. WORM SHAFT BEARING, LONG	154. PIPE
43. PAPER	99. 4° LEVER	155. OIL SUPPLY TANK
44. BEARING	100. 1/2" LEVER	156. AIR VENT AND FILL PLUG
45. THRENT COLLAR	101. LOCKING PIN	157. OIL LEVEL INDICATOR
46. DIFFERENTIAL PINION AND SHAFT	102. BUSHING	158. PUMP (SEE WATERBURY TCG1 C-0 LINE)
47. CONTROL RACK	103. BUSHINGS	159. COUPLING, HALF PUMP END
48. CONTROL RACK, STARBOARD COVER	104. BUSHINGS	160. COUPLING, CENTER MEMBER
49. CONTROL RACK, STARBOARD BEARING	105. BUSHINGS	161. COUPLING, HALF MOTOR END
50. CLUTCH	106. BUSHINGS	162. STARBOARD MOTOR
51. CLUTCH	107. BUSHINGS	163. PORT MOTOR
52. CONTROL RACK, STARBOARD BEARING	108. BUSHINGS	164. STARBOARD POWER UNIT MEDIUM ALT
53. CONTROL RACK	109. BUSHINGS	165. PORT POWER UNIT MEDIUM ALT
54. CONTROL RACK	110. BUSHINGS	166. SPECIAL NUT
55. CONTROL RACK, STARBOARD BEARING	111. AFTER GLAND	167. BEARINGS BOX
56. CONTROL RACK	112. AFTER STARBOARD BEARING	168. DRAIN VALVE ADAPTER

FILL HYDRAULIC SYSTEM WITH OIL SAE 20

MANUFACTURERS' RECOMMENDATIONS

	SP. Grav.	Cold Test	Flash Point	Fire Point	Viscosity S.S.U. — F°			
					100	130	140	210
Atlantic Refining Co. Turbine Oil — Heavy	.879	10°	425	485	290		120	53
Cities Service Refining Co. North Star No. 5	.930	0°	340	390	300	138		48
Gulf Refining Co. Gulf Crest C	.879	10°	420	480	300	140		52
E. F. Houghton & Co. Cosmolubric Med. Heavy Refrig.	.912	—30°	380	440	310		116	50
Sinclair Refining Co. Rubilene Med. Light Med.	.907 .903	10°	400 415	500 480	300 310	100 147	142	52
Socony-Vacuum Corp. Gargoyle D.T.E. Heavy Med.	.905	10°	390	445	320	143	118	50
Standard Oil Co., Indiana Stanolind Turbine Oil, Heavy	.900	40°	410	465	350	165	136	56
Standard Oil Co., N. J., Pa., La. & Colonial Beacon — Teresso 52	.884	25°	440	490	320	150	125	52
Texas Company Regal Oil C	.922	0°	375	430	317	138		47
Tide Water Oil Co. Tycol Heavy Medium	.896	10°	430	490	300		118	52

VARIABLE DELIVERY PUMP
BUILT BY
WATERBURY TOOL
DIVISION OF VICKERS INCORPORATED
WATERBURY, CONN.



SPECIFIED AS STANDARD EQUIPMENT
FOR
HYDRO ELECTRIC STEERING GEAR

HYDE WINDLASS COMPANY
BATH, MAINE

No. 23

DESCRIPTION OF UNIT

The pumps built by The Waterbury Tool Division of Vickers Incorporated are of the rotary variable displacement type with axially disposed pistons.

HOW THE PUMP OPERATES

Referring to the pump, or A-End, cut on cover and section view on page 4, when the tilting box and its socket ring are set at neutral position, that is, perpendicular to the shaft, rotation of the shaft will carry around with it the socket ring, cylinder barrel, pistons, and connecting rods, but the pistons will not reciprocate or move to and fro in the cylinders. There will therefore be no drawing of oil into or forcing it out of the valveplate, and the pump is said to be at neutral.

If now the control shaft is moved a little so as to move the top of the tilting box away from the valveplate, with the A-shaft rotating the top away from the observer, all the pistons as they move down on the far side of the machine, will force oil in through the port in the far side of the valveplate. Likewise, all the pistons, as they move up on the near side, will slide away from the valveplate and suck oil through the port in the near side of the valveplate. The far port will thus be under pressure while the near port is in suction.

It is noticed that when any piston is on top or bottom dead center it makes no endwise motion, and at this time is over the land or space between the valveplate ports, this land thus separating the high and low pressure.

It can now be readily seen that the amount of oil pumped is in proportion to the angle of the tilting box from neutral. Also, that if the tilting box were tilted toward the valveplate, the A-shaft rotating as before, the movement of oil through the valveplate ports would be reversed.

FILLING WITH OIL

A hydraulic power system functions at its best when entirely filled with oil and free as possible from air. For this reason, filling of the system requires considerable care and attention.

First, it is necessary to open both needle valves on top of valveplate, or if these are connected to gauges, break the piping temporarily. Pour the oil through the filter into the oil expansion box until it appears at the needle valves.

Entry of air at time of filling cannot be entirely prevented. It can, however, be materially reduced by adding make-up oil very slowly. Strain oil through a fine mesh wire screen (120 mesh) as it is poured into the system. Surfaces around filler openings should be wiped and cleaned of dirt and grit before plugs are removed.

The connecting pipes between the pump and rams must be provided with plugs at highest point, in order to clear the active system from air. These should be manipulated a few times to clear all air from the system. Before closing the needle valves on the valveplate, give the shaft a few turns in each direction to force the air out of the cylinders and valveplate ports, maintaining the oil level in the oil expansion box during this time. It will be necessary to remove the air plugs in the highest points in the oil system from time to time during this procedure in order to let air escape.

Finally, there must be no air in the system; but it may be impossible to get it all out before running the pump under power. The pump should be run a few minutes and then stopped.

The oil expansion box should be about two-thirds full of oil at all times.

AIR IN THE HYDRAULIC SYSTEM

Presence of air in the pump is usually accompanied by one or more of the following symptoms:

1. Noisy Operation
2. Variation of speed of hydraulic ram, especially slowing down under load, without change in pump stroke.

If, after following the above instructions, there are still indications of air in the system, it will be advisable to operate the pump for twenty or thirty minutes at short stroke and high pressure. The air will be forced out of the active system into the case and will vent to the expansion tank.

CARE AND OPERATION

CLEANLINESS — It is absolutely necessary that every precaution be taken to keep out all dirt and gritty material, both in assembling the pump and in filling with oil.

Take special care during installation to remove all scale, sand and foreign matter from piping.

Avoid mixing mineral with animal or vegetable oils.

DO NOT use steam cylinder oil.

DO NOT MIX together two different brands of oil, as they may cause a gummy deposit to form on the parts. If such a deposit collects on the replenishing valves, it will prevent their closing properly.

OPENING FOR INSPECTION — As long as a machine operates satisfactorily it should not be opened. Experience has shown that machines give the best service when they are not disturbed.

OIL

For Waterbury Hydraulic Variable Delivery Pumps

The following Navy specification oils are recommended for use in Waterbury Pumps:

For Summer Use	Navy Spec. 2135
For Winter Use	In exposed locations Navy Spec. 2110
For All Weather Use	Navy Department, Bureau of Ordnance — Spec. 1113
For all applications using Hydraulic Control Mechanisms	Navy Department, Bureau of Ordnance — Spec. 1113

For continuous duty change oil every six months.

ANNUAL THERMAL AND MECHANICAL TESTS

SLIDING CONTROL

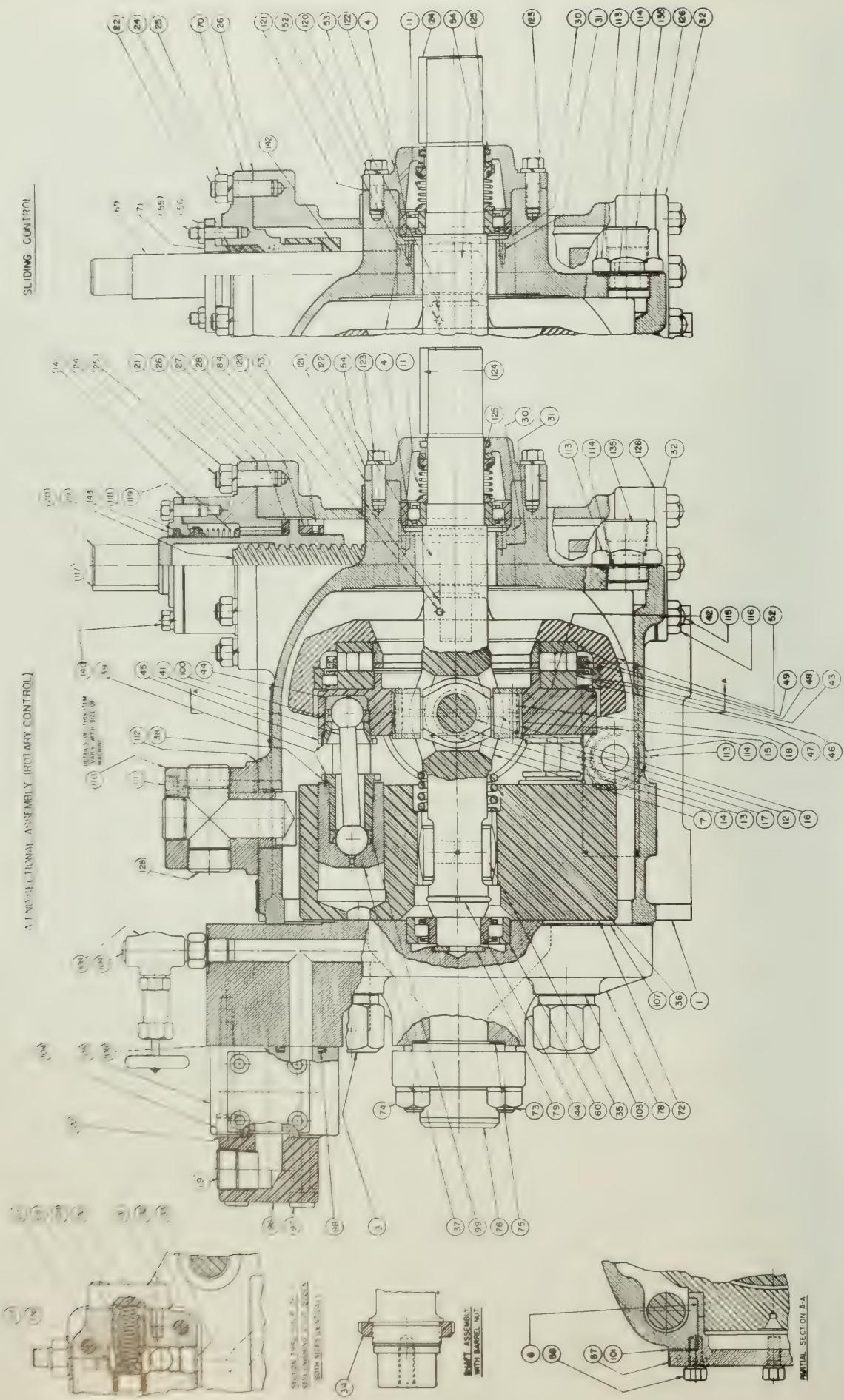


Figure 1.

PARTS LIST

(References are to numbers appearing in Fig. 1)

1. A-CASE
2. B-CASE
3. CASE BOLT AND NUT ASSEMBLY
4. MAINSHAFT BEARING
6. CASE TRUNNION BUSHING
- 7 MAINSHAFT
- 11 MAINSHAFT ROTARY SEAL
- 12 MAINSHAFT PIN
- 13 MAINSHAFT PIN BUSHING
- 14 MAINSHAFT PIN BUSHING PIN
- 15 MAINSHAFT PIN RETAINER
- 16 SHAFT TRUNNIONED BLOCK
- 17 TRUNNION BEARING BLOCK
- 18 BEARING BLOCK SCREW
- 19 PIPE PLUG
- 20 CONTROL SHAFT ROTARY
- 21 CONTROL SHAFT BEARING ROTARY
- 22 CONTROL SHAFT PACKING
- 23 CONTROL BEARING STUD
- 24 CONTROL BEARING STUD NUT
- 25 CONTROL BEARING GASKET
- 26 CONTROL THRUST RING
- 27 CONTROL SHAFT HANGER
- 28 CONTROL NUT
- 29 CONTROL GUIDE KEY
- 31 CONTROL GUIDE KEY PIN
- 32 CONTROL HOLLOWING CAP
- 33 PIPE PLUG
- 34 PIPE PLUG
- 35 PIPE PLUG
- 36 CONTROL GUIDE KEY
- 37 CONTROL GUIDE KEY PIN
- 38 CONTROL HOLLOWING CAP
- 39 PIPE PLUG
- 40 PIPE PLUG
- 41 PIPE PLUG
- 42 PIPE PLUG
- 43 PIPE PLUG
- 44 PIPE PLUG
- 45 PIPE PLUG
- 46 PIPE PLUG
- 47 RADIAL RACE
- 48 THRUST ROLLER GROUP
- 49 BOX THRUST RACE
50. ANGLE BOX
51. ANGLE BOX SCREW
52. TILTING BOX
53. TILTING BOX STUD
54. TILTING BOX STUD BUSHING
55. CONTROL GLAND STUD
56. CONTROL GLAND STUD NUT
57. TRUNNION COVER
58. TRUNNION COVER SCREW
60. VALVEPLATE BEARING
67. REPLENISHING VALVE SEAT
68. REPLENISHING VALVE PISTON
69. SHAFT SLIDING
70. CONTROL SHAFT BEARING SLIDING
71. CONTROL SHAFT PACKING GLAND SLIDING
- 72 CYLINDER BARRREL
- 73 PIPE FLANGE STUD
- 74 PIPE FLANGE STUD NUT
- 75 PIPE FLANGE GASKET
- 76 PIPE FLANGE
- 78 VALVEPLATE
- 79 INTERSHAFT DISC
- 84 CONTROL SHAFT HANGER KEY
- 96 VALVE BLOCK FLANGE
- 97 FLANGE RETAINING SCREW
- 98 VALVE BLOCK SEAL
- 99 PISTON SOCKET CAP
- 100 RING SOCKET CAP
- 101 TRUNNION COVER GASKET
- 102 VALVE BLOCK FLANGE GASKET
- 103 CASE BOLT WASHER
- 104 VALVE BLOCK RETAINING SCREW
- 105 REPLENISHING VALVE BLOCK
- 106 VALVE BLOCK GASKET
- 107 CASE GASKET
- 108 NEEDLE VALVE
- 109 PIPE PLUG
- 110 OIL SCOOP
- 111 OIL SCOOP RETAINING SCREW
- 112 OIL SCOOP GASKET
- 113 CASE CONNECTION ADAPTER
- 114 ADAPTER WASHER
- 115 HOUSING CAP STUD
- 116 STUD NUT
- 117 CONTROL SHAFT KEY
- 118 CONTROL SHAFT DUST SEAL
- 119 BEARING CAP GASKET
120. TILTING BOX STUD PIN
121. BEARING CAP GASKET
122. BEARING CAP
123. BEARING CAP SCREW
124. MAINSHAFT KEY
125. MAINSHAFT DUST SEAL
- 126 HOUSING CAP GASKET
127. NEEDLE VALVE ADAPTER
128. PIPE PLUG
- 129 REPLENISHING VALVE SPRING
- 130 REPLENISHING VALVE CAP
131. REPLENISHING VALVE CAP SCREW
- 132 REPLENISHING VALVE CAP GASKET
- 133 VALVE BLOCK HOLE PLUG
- 134 WASHER
- 135 PIPE PLUG
- 136 WASHER
- 137 WASHER
- 138 PLUG
- 139 ANGLE BOX DOWEL
- 140 CONTROL BEARING CAP SCREW
- 141 CONTROL SHAFT ROTARY SEAL
- 142 CONTROL SHAFT STOP FOR SLIDING
- 143 CONTROL
- 144 CONTROL BEARING CAP
- 145 BARREL LOCK RING

MANUFACTURERS' RECOMMENDATIONS

	SP. Grav.	Cold Test	Flash Point	Fire Point	Viscosity S.S.U. — F°			
					100	130	140	210
Atlantic Refining Co. Turbine Oil — Heavy . . . . .	.879	10°	425	485	290		120	53
Cities Service Refining Co. North Star No. 5 . . . . .	.930	0°	340	390	300	138		48
Gulf Refining Co. Gulf Crest C . . . . .	.879	10°	420	480	300	140		52
E. F. Houghton & Co. Cosmolubric Med. Heavy Refrig. .	.912	-30°	380	440	310		116	50
Sinclair Refining Co. Rubilene Light ^{Med.} . . . . .	.903 .905	10°	415 400	480 505	310 305	147 130	142	52 54
Socony-Vacuum Corp. Gargoyle D.T.E. Heavy Med. . . . .	.905	10°	390	445	320	143	118	50
Standard Oil Co., Indiana . . . . .	.900	40°	410	465	350	165	136	56
Standard Oil Co., N. J., Pa., La. & Colonial Beacon — Teresso 52 . . . . .	.884	25°	440	490	320	150	125	52
Texas Company Regal Oil C . . . . .	.922	0°	375	430	317	138		47
Tide Water Oil Co. Tycol Heavy Medium . . . . .	.896	10°	430	490	300		118	52

HYDE
STEAM AND ELECTRIC
WINDLASSES



HYDE WINDLASS COMPANY
BATH, MAINE

No. 24

Description

HYDE STEAM SPUR GEARED WINDLASS

THE steam windlasses for handling anchor chains today are usually of the spur geared type, similar to illustration on opposite page.

Each of the two wildcats for handling chain has a positive locking device, also friction brake band operated by means of hand wheel.

The gypsys on each side are for handling lines and used generally for warping vessels at the dock.

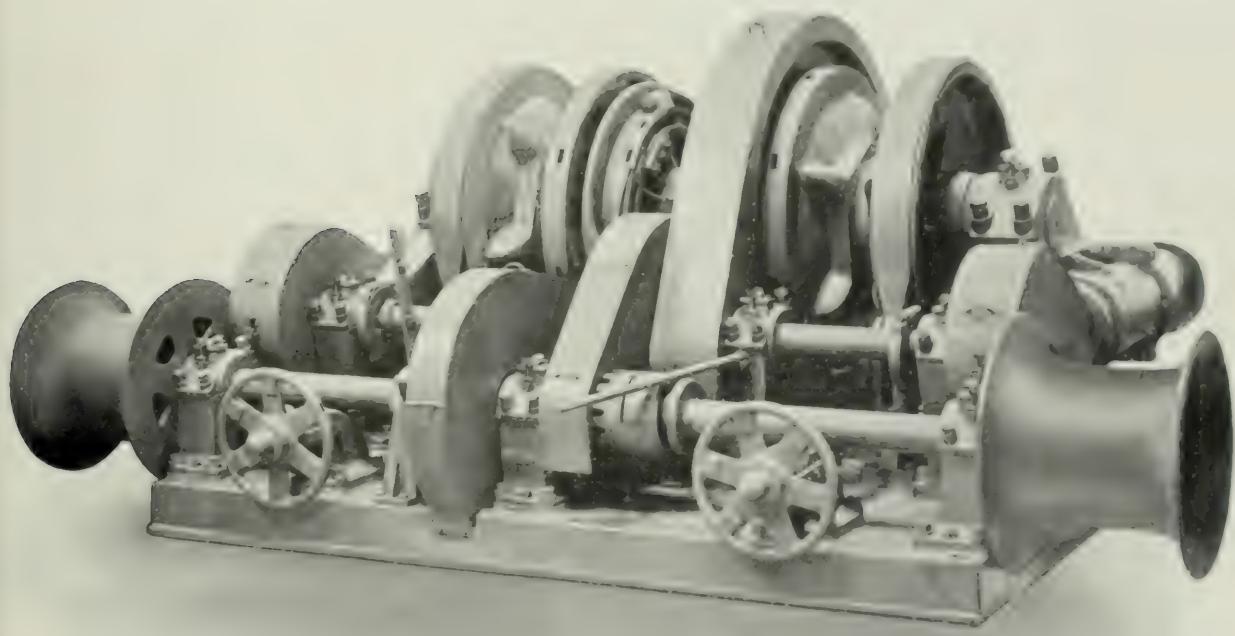
The gears and pinions are steel castings, the teeth of which are accurately machined. Guards are fitted over gearing.

The windlass is driven by reversible, double, horizontal engines self-contained on bedplate with windlass.

Windlasses are designed according to weight of anchor and chains and when sending out inquiries for prices, the size of anchor chain and weight of anchor should be specified.

Windlasses are capable of hoisting simultaneously both anchors and chain from a depth of 30 fathoms at an average speed of 25 to 30 feet per minute.

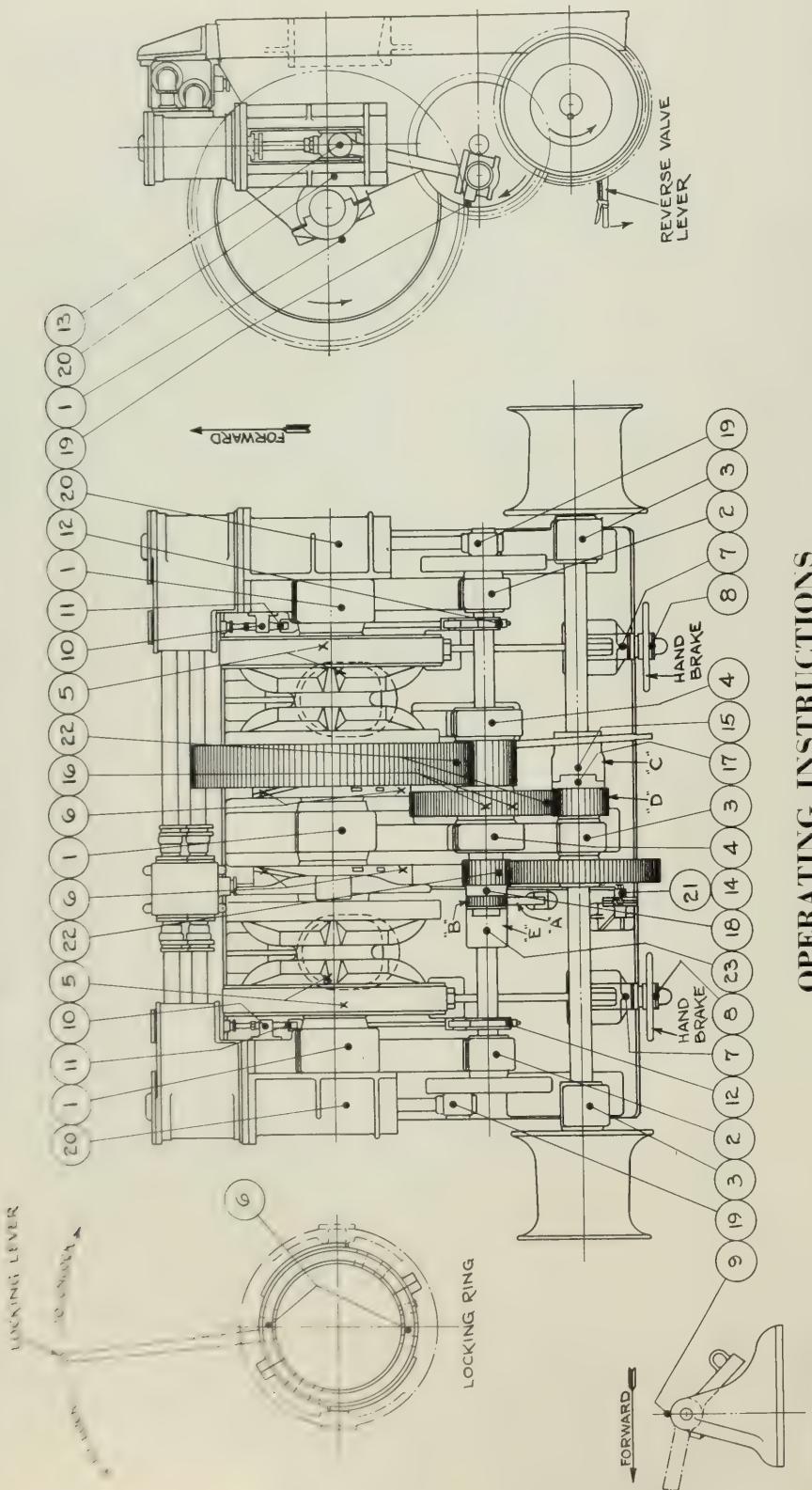
On pages 4 and 5 are given the instructions for operating and lubricating the windlass, and on pages 6 and 7 are sectional views and list of parts.



THE HYDE STEAM SPUR GEARED WINDLASS

No.	Size Chain	Size Engine	Weight lbs	Distance from chains	Width over wheels	Length Fore and Aft
1	1"	4 1/2 x 6	3,250	17 1/2"	6' 0"	1' 11 1/2"
2	1 1/8"	4 1/2 x 6	3,500	17 1/2"	6' 0"	1' 11 1/2"
3	1 1/4"	6 x 8	6,000	20 1/2"	7' 5"	5' 1"
4	1 3/8"	6 x 8	7,000	20 1/2"	7' 5"	5' 1"
5	1 1/2"	7 x 8	10,200	34"	9' 1"	6' 6"
6	1 5/8"	7 x 8	11,000	34"	9' 1"	6' 6"
7	1 3/4"	8 x 8	15,000	35 1/4"	11' 0"	7' 0"
8	1 7/8"	8 x 10	18,000	38 1/4"	11' 3"	7' 3"
9	2"	9 x 10	24,000	47"	12' 3"	8' 7"
10	2 1/8"	9 x 10	26,000	48"	12' 4"	8' 7"
11	2 1/4"	10 x 10	29,800	49 1/4"	12' 11 1/2"	8' 7"
11	2 3/8"	10 x 11	34,000	50 1/4"	12' 11 1/2"	9' 5"
12	2 1/2"	11 x 11	42,000	56"	14' 4"	9' 6"
13	3"	12 x 11	51,000	59 1/4"	15' 1"	10' 4"

HYDE STEAM SPUR GEARED WINDLASS



OPERATING INSTRUCTIONS

The windlass is operative in either direction by use of a reverse valve actuated by a hand lever located on after side of windlass.

The engines are designed for a steam pressure of 125 lbs. if the steam supply is at a greater pressure, a reducing valve should be provided in the steam line. Before operating windlass under load it is recommended that the engines be turned over for a short time with cylinder drain cocks open to free the system of water. Then close drain cocks and operate as needed.

Locking blocks are engaged with and disengaged from the wildcat by operator inserting a lever in the locking ring and moving top of ring aft to unlock and forward to lock. Always move locking ring the full extent of travel to insure proper alignment of the locking blocks.

Pawl "A" is provided to engage with pinion "B" on crank shaft for the purpose of holding heavy loads. Under ordinary operating conditions this pawl should be disengaged.

To lower an anchor, first see that the hand brake is set on the wildcat of the anchor selected to be lowered. Lift chain stopper pawl clear of chain, unlock wildcat and release hand brake. It is recommended that when lowering the anchor it be kept under control by the hand brake. After chain is veered to the desired length, the chain stopper pawl is dropped in place for "riding by" and to relieve strain on windlass. An anchor may be lowered with use of engines if desired.

To hoist an anchor see that the locking blocks engage

wildcat. Release hand brake and start engines by opening throttle valve in steam line and moving reverse valve lever aft in direction of arrow. After anchor is housed, set hand brake and unlock wildcat.

If it is desired to use the warping heads and not the wildcats, disengage clutch "C" from pinion "D". The warping heads may now be operated in either direction.

Should it be necessary to idle engines, clutch "E" on crank shaft must be disengaged from pinion "B".

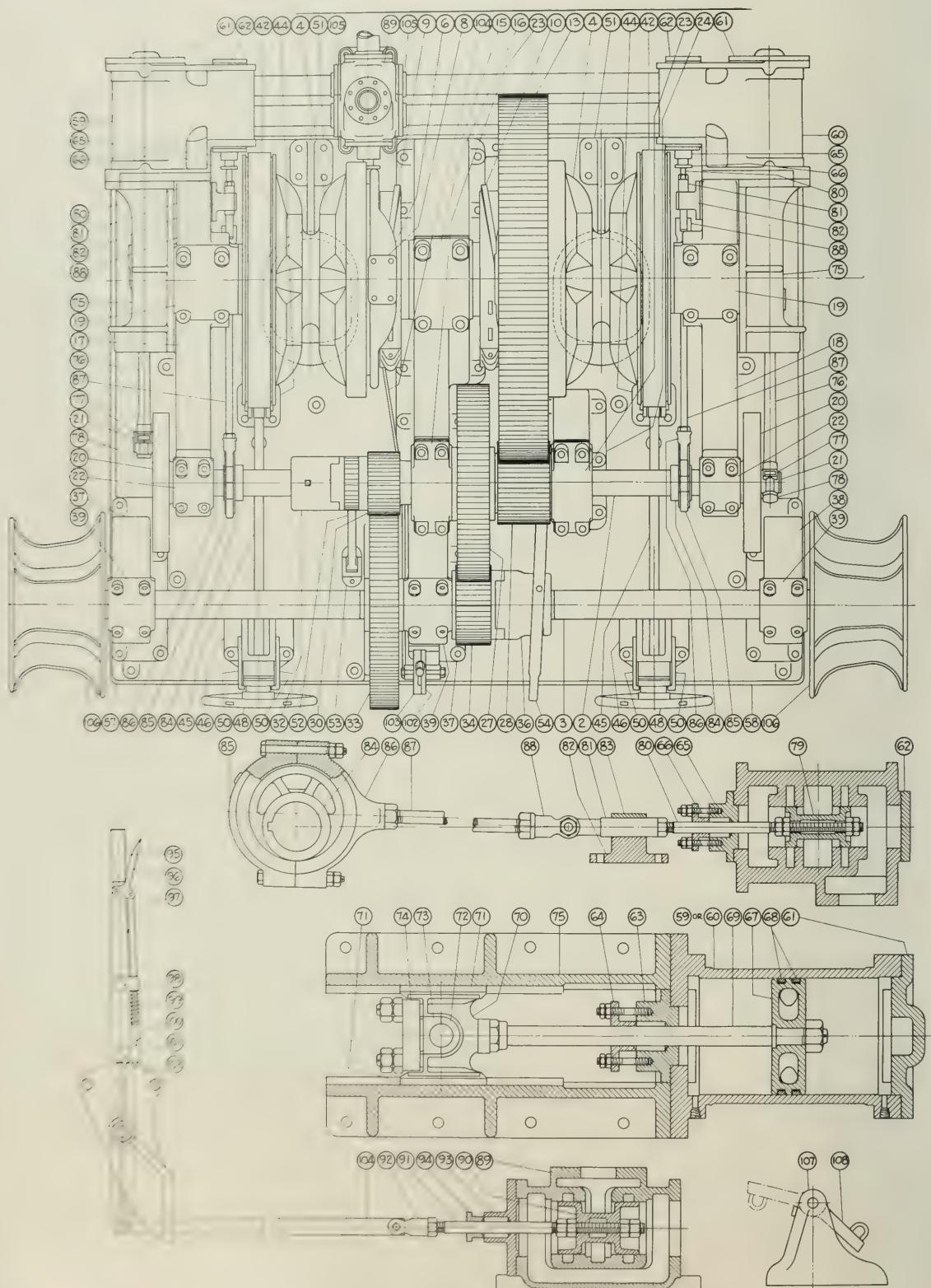
LUBRICATION INSTRUCTIONS

Symbol ● indicates that place of application may be seen in view so marked.

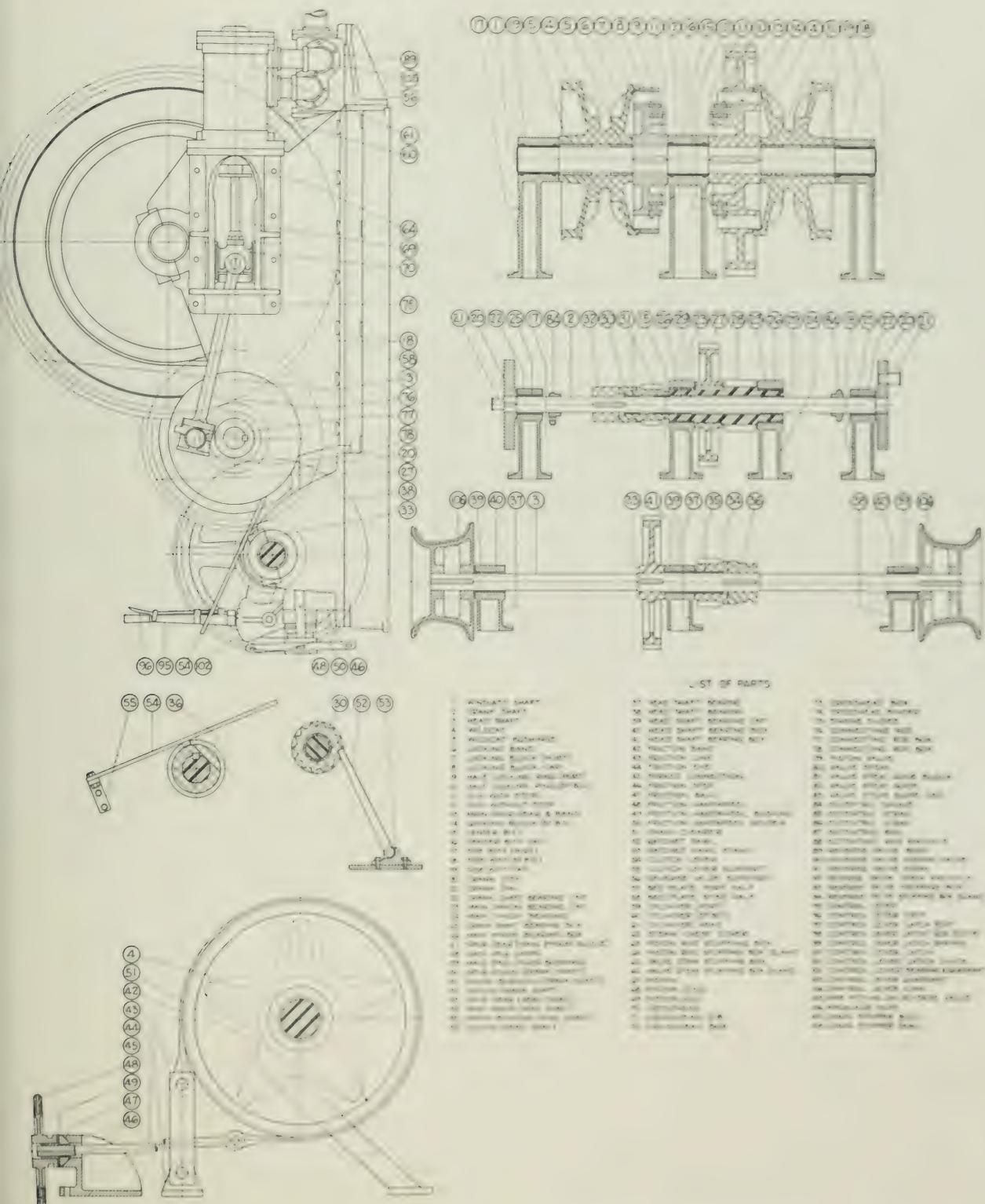
Symbol X indicates that place of application is not in sight in view so marked but accessible under N.

Mark	Part Lubricated	No. of Places	Method	Lubricant	Spec's	Medium Grade	Daily when operating	Application
1	Windlass Shaft Bearings	3	Pressure	Grease				
2	Crank Shaft Bearings	2						
3	Head Shaft Bearings	3						
4	Main Pinion Sleeve Bearings	2						
5	Wildcat Bushings	4						
6	Locking Rings	1						
7	Friction Steps	2						
8	Friction Brake Handwheels	2						
9	Chain Stopper Pawls	2						
10	Valve Stem Guides	2						
11	Eccentric Rod Knuckles	2						
12	Eccentric Straps	2						
13	Wrist Pins	2						
14	Reverse Valve Lever Bearing	1						
15	Head Shaft Clutch	1						
16	Main Pinion Bushings	2						
17	Intermediate Pinion Bushing	1						
18	Drive Pinion Bushing	1						
19	Crank Pins	2	Oil Can	Oil				
20	Crosshead Slides	2	"	"				
21	Reverse Valve Link Pins	2	"	"				
22	Spiral Gears	3	Brush	Grease	Great Gear			
23	(Crank Shaft) Clutch	1	Pressure	"	Medium Grade			
					S. A. E. 20			

HYDE STEAM WINDLASS — LIST OF PARTS



HYDE STEAM WINDLASS — LIST OF PARTS



Description

HYDE ELECTRIC SPUR GEARED WINDLASS

THE electrically driven auxiliaries for use on shipboard are used quite extensively today. The windlass illustrated on opposite page is of the electric spur geared type.

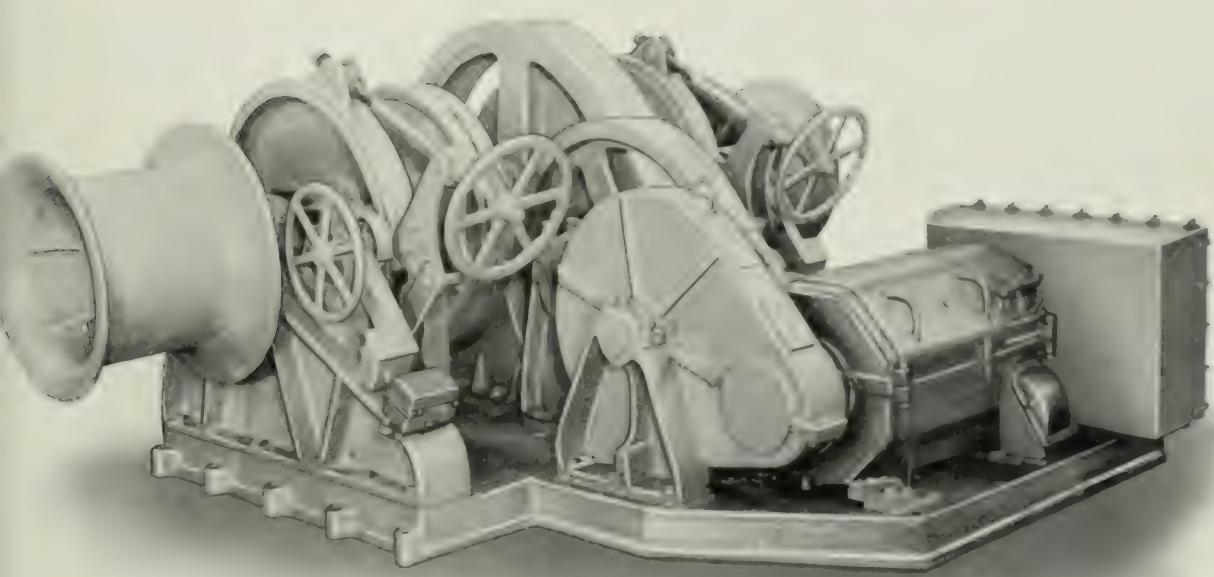
The windlass is very similar in design to the steam windlass shown on page 2 and has two wildcats; each wildcat fitted with independent locking device and brake band operated by hand wheel.

Two gypsys are fitted on ends of windlass shaft for handling lines used generally for warping ship at the dock.

The motor for driving the windlass is located just aft of the windlass self-contained on same bedplate. Motor is fitted with a magnetic shoe type brake. Both motor and brake are made water-tight for locating on deck exposed to the weather.

When writing for prices, weight of anchor should be specified as well as size of chain and also advise whether AC or DC current and the voltage. This information is necessary in order to determine size of windlass and correct horse power of motor.

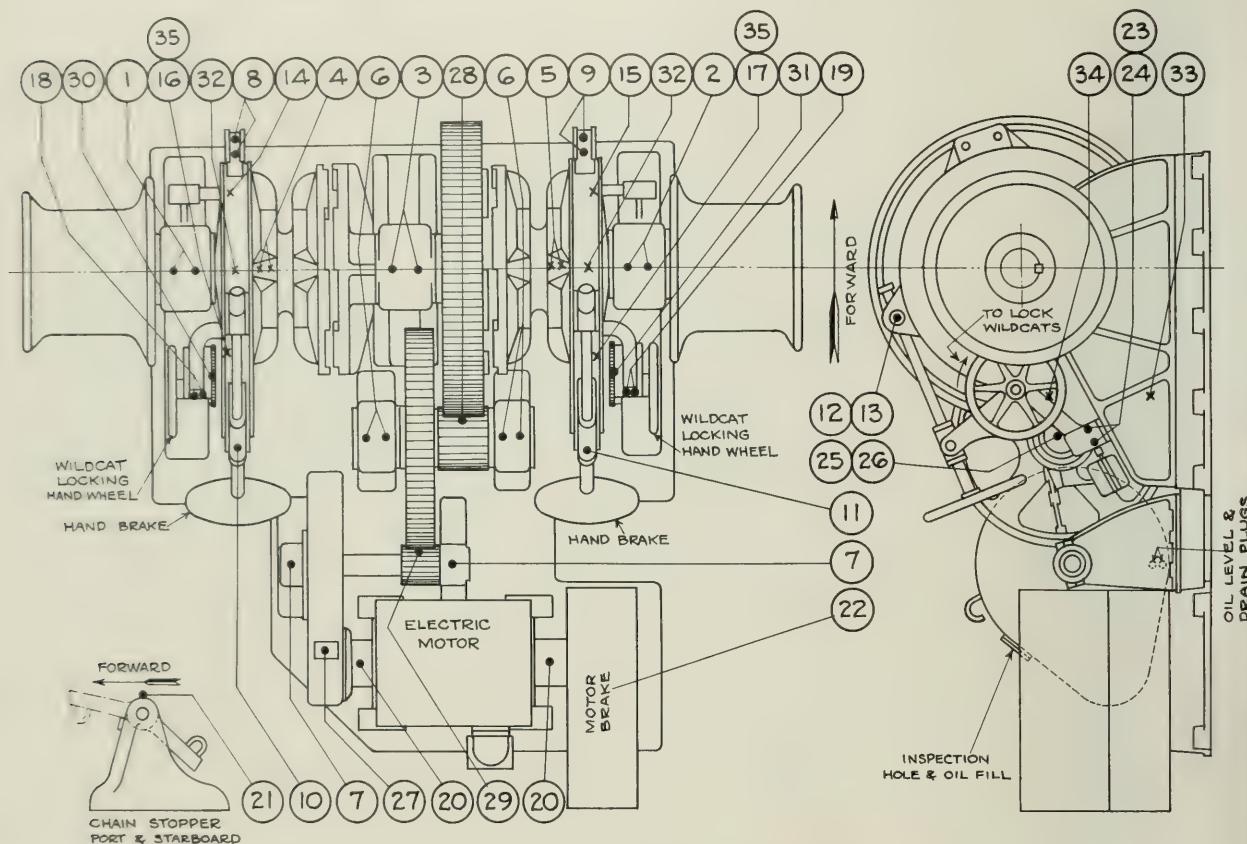
On pages 10 and 11 are given instructions for operating and lubricating the windlass and on page 12 is a sectional view and on page 13 a list of parts.



HYDE ELECTRIC SPUR GEARED WINDLASS

No.	Size Chain	H.P. Motor	Weight Lbs.	Distance c. to c. Chains	Width over Grapesys	Length Fore and Aft
3	11 $\frac{1}{4}$ "	15	6600	2' 11 $\frac{1}{2}$ "	7' 3"	7' 6"
4	13 $\frac{5}{8}$ "	20	7000	2' 11 $\frac{1}{2}$ "	7' 3"	7' 6"
5	11 $\frac{1}{2}$ "	25	10700	2' 8"	7' 10"	7' 11"
6	15 $\frac{5}{8}$ "	30	13000	2' 8"	7' 10"	7' 11"
7	13 $\frac{3}{4}$ "	35	15500	3' 3"	9' 8"	9' 11"
8	17 $\frac{5}{8}$ "	35	16000	3' 3"	9' 8"	9' 11"
9						
10						
11	21 $\frac{1}{4}$ "	60	26500	4' 0"	12' 2"	11' 0"
12	21 $\frac{1}{2}$ "	75	38000	4' 3"	13' 1"	11' 1"
13	23 $\frac{1}{4}$ "	75	48000	4' 11 $\frac{1}{4}$ "	14' 0"	11' 10"

HYDE ELECTRIC SPUR GEARED WINDLASS



OPERATING INSTRUCTIONS

For the windlass to be operative, the normal power supply must be available at the controller terminals and unblown fuses in place.

The wildcats are engaged with or disengaged from the locking heads by use of handwheels located on either side of the machine. To lock a wildcat, move top of handwheel forward until grabs on wildcat are fully engaged with those on locking head. To unlock, reverse operation.

To lower an anchor by power, see that the wildcat of the anchor selected to be lowered is engaged with locking head. Lift chain stopper pawl clear of chain, release hand brake and move electric control lever to "lower" position. Faster lowering may be obtained by moving control lever to second or third position. Moving control lever to "stop" position stops motor and sets magnetic brake. After chain is veered to desired

length, the chain stopper pawl is dropped in place for "riding by" and to relieve strain on windlass.

An anchor may be lowered free by having the wildcat disengaged and releasing the hand brake. Set brake again when the desired amount of chain is out. It is recommended that when anchor is lowered free, it be kept under control by hand brake.

To hoist the anchor, see that wildcat is engaged with locking head, release hand brake and move electric control lever to the "hoist" position of the speed desired. After anchor is housed, set hand brake and unlock wildcat.

If it is desired to use the warping heads and not the wildcats, set hand brakes sufficiently to hold wildcats stationary, then unlock wildcats. The warping heads may now be operated in either direction by electric motor.

OPERATING INSTRUCTIONS (Continued)

LUBRICATION INSTRUCTIONS

Symbol ● indicates that place of application may be seen in view so marked.

Symbol X indicates that place of application is not in sight in view so marked but accessible under X.

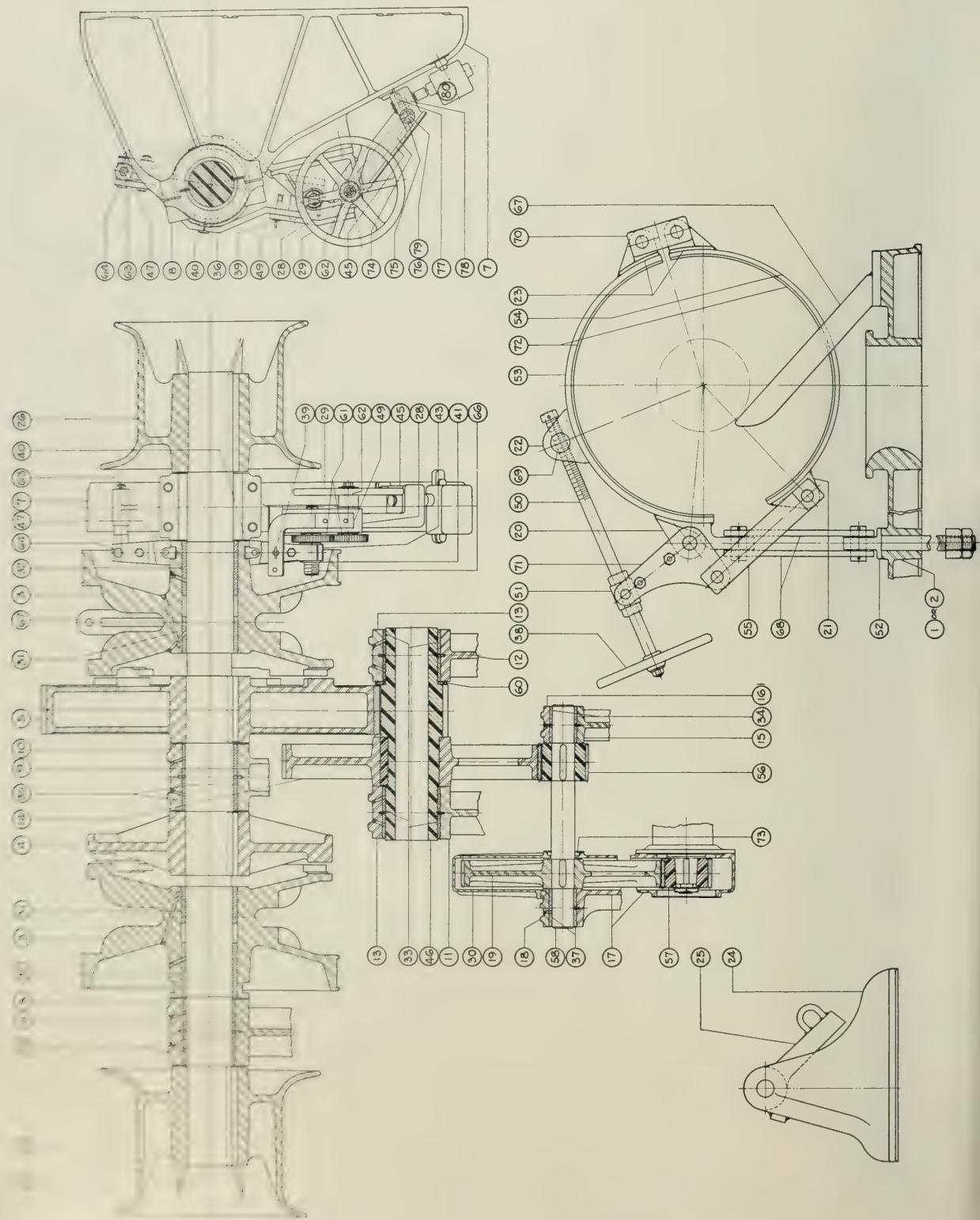
Mark	Part Lubricated	No. of Places	Method	Lubricant	Spec's	Application
1	Side Bitt, Port	2	Pressure	Grease	Medium Grade	Daily when operating
2	Side Bitt, St'b'd	2	"	"	"	"
3	Center Bitt	2	"	"	"	"
4	Wilcat Bushings, Port	2	"	"	"	"
5	Wilcat Bushings, St'b'd	2	"	"	"	"
6	Intermediate Shaft Bearings	1	"	"	"	"
7	Counter Shaft Bearings	2	"	"	"	"
8	Brake Band Hinge Lug, Port	2	"	"	"	"
9	Brake Band Hinge Lug, St'b'd	2	"	"	"	"
10	Bell Crank Trunnion, Port	1	"	"	"	"
11	Bell Crank Trunnion, St'b'd	1	"	"	"	"
12	Brake Rod Nut, Port	1	"	"	"	"
13	Brake Rod Nut, St'b'd	1	"	"	"	"
14	Locking Lever Fulcrum, Port	1	"	"	"	"
15	Locking Lever Fulcrum, St'b'd	1	"	"	"	"
16	Floating Nut, Port	1	"	"	"	"
17	Floating Nut, St'b'd	1	"	"	"	"
18	Locking Screw Bearing, Port	2	"	"	"	"
19	Locking Screw Bearing, St'b'd	2	"	"	"	"
20	Motor	2	"	"	"	Quarterly
21	Chain Stopper Pawl, Port & St'b'd	2	"	"	"	Daily when operating
22	Motor Brake Parts	6*	Oil Can	Oil	SAE 20	"
23	Worm Gear Bearings, Port	2	"	"	"	"
24	Worm Gear Bearings, St'b'd	2	"	"	"	"
25	Chain Sprocket Case, Port	1	"	"	"	"
26	Chain Sprocket Case, St'b'd	1	"	"	"	"
27	Motor Spur Gear Case	1	"	"	SAE 40	Keep full of lubricant Change case oil yearly
28	Main Gears	1	Brush	Grease	Medium Grade	Daily when operating
29	Intermediate Gears	1	"	"	"	"
30	Locking Screw Gears, Port	1	"	"	"	"
31	Locking Screw Gears, St'b'd	1	"	"	"	"
32	Locking Yokes, Port & St'b'd	2	Pressure	"	Medium Grade	"
33	Brake Anchor Bolt Pins, Port & St'b'd.	2	"	"	"	"
34	Brake Band Anchor Lugs, Port & St'b'd.	2	"	"	"	"
35	Locking Lever Gibs, Port & St'b'd.	2	"	"	"	"

* Approximately

GENERAL NOTE:

Frequency of application should be governed by the operating hours of machine together with the temperature under which machine is operated.

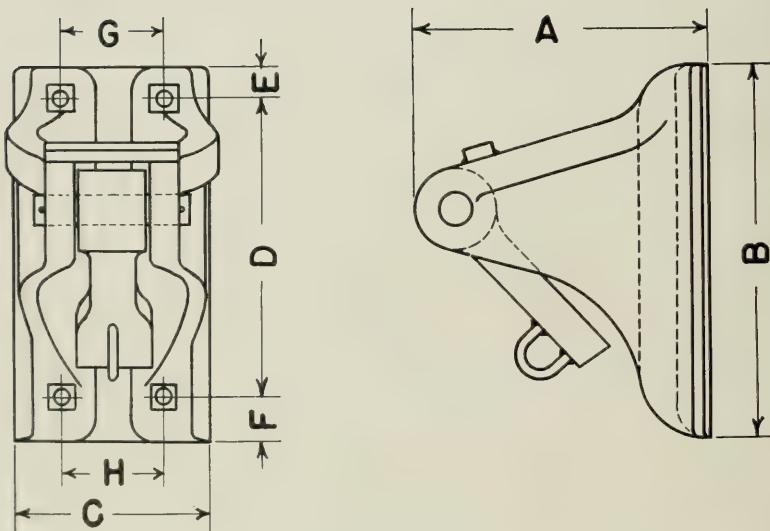
HYDE ELECTRIC SPUR GEARED WINDLASS



LIST OF PARTS

1. BED PLATE, PORT HALF
2. BED PLATE, STARBOARD HALF
3. WILDCAT
4. DRIVING HEAD
5. MAIN SPUR GEAR
6. SIDE BITT, PORT
7. SIDE BITT, STARBOARD
8. SIDE BITT BEARING CAP
9. CENTER BITT
10. CENTER BITT BEARING CAP
11. INTERMEDIATE SHAFT BEARING, PORT
12. INTERMEDIATE SHAFT BEARING, STARBOARD
13. INTERMEDIATE SHAFT BEARING CAP
14. INTERMEDIATE SPUR GEAR
15. COUNTER SHAFT BEARING
16. COUNTER SHAFT BEARING CAP
17. MOTOR SPUR GEAR CASING
18. GEAR CASING BEARING CAP
19. MOTOR SPUR GEAR
20. BRAKE BAND ANCHOR LUG
21. BELL CRANK LINK LUG
22. BRAKE SCREW NUT LUG
23. BRAKE BAND HINGE LUG
24. CHAIN STOPPER BODY
25. CHAIN STOPPER PAWL
26. WINDLASS HEAD
27. LOCKING SCREW BEARING, PORT
28. LOCKING SCREW BEARING, STARBOARD
29. LOCKING HANDWHEEL
30. SPUR GEAR CASING COVER
31. WILDCAT BUSHING
32. WILLOCAT BUSHING
33. INTERMEDIATE SHAFT BEARING BOX
34. COUNTER SHAFT BEARING BOX
35. CENTER BITT BEARING BOX
36. SIDE BITT BEARING BOX
37. GEAR CASING BEARING BOX
38. BRAKE HANDWHEEL
39. LOCKING PIN
40. TOME
41. FLOATING NUT GIB
42. FLOATING NUT, PORT
43. FLOATING NUT, STARBOARD
44. CHAIN AND SPROCKET CASE, PORT
45. CHAIN AND SPROCKET CASE, STARBOARD
46. MAIN SPUR PINION
47. LOCKING LEVER
48. LOCKING LEVER QUADRANT, PORT
49. LOCKING LEVER QUADRANT, STARBOARD
50. BRAKE SCREW
51. BELL CRANK TRUNNION
52. BRAKE BAND ANCHOR BOLT
53. BRAKE BAND, UPPER HALF
54. BRAKE BAND, LOWER HALF
55. BELL CRANK LINK
56. INTERMEDIATE SPUR PINION
57. MOTOR SPUR PINION
58. COUNTER SHAFT
59. WINDLASS SHAFT
60. MAIN SPUR PINION COLLAR
61. LOCKING SPUR GEAR
62. LOCKING HANDWHEEL SHAFT
63. LOCKING LEVER FULCRUM
64. LOCKING LEVER FULCRUM PIN
65. LOCKING SCREW, PORT
66. LOCKING SCREW, STARBOARD
67. CHAIN CLEAVER
68. BRAKE BAND ANCHOR LINK
69. BRAKE SCREW NUT
70. BRAKE BAND HINGE LINK
71. BELL CRANK
72. BRAKE BAND LINING
73. OIL SEAL RING
74. SPROCKET CHAIN
75. CHAIN SPROCKET
76. WORM
77. WORM GEAR
78. WORM GEAR SHAFT
79. WORM AND SPROCKET SHAFT
80. DUAL CONTROL LIMIT SWITCH

HYDE COMMON CHAIN STOPPERS



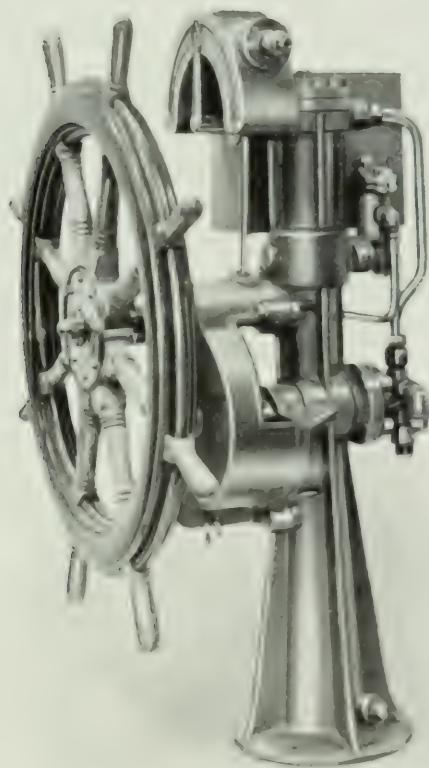
Size of Chain	1/2	5/8	3/4	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/8	2 1/4	2 1/2	2 3/4
Size of Bolt	1/2	1/2	5/8	3/4	7/8	7/8	1	1	1 1/8	1 1/8	1 1/4	1 1/4	1 1/4	1 1/4	1 3/8	1 3/4
A	5 1/4	7 1/4	8 1/4	9 3/4	12 5/8	12 5/8	16 1/8	16 1/8	17 1/4	19	20 7/8	20 7/8	23 1/4	25	27	29 1/4
B	8	9	10 7/8	13 1/2	16 1/2	16 1/2	19 1/2	19 1/2	22	24 1/2	25	25	30	31 1/2	36	44
C	1 1/2	5	6 1/4	7	9	9	11	11	12 1/2	13 1/2	14	14	15	16 3/4	18	19
D	7	6 1/4	8 1/4	10 1/8	12 3/4	12 3/4	16	16	18	20 1/2	20 1/2	20 1/2	25	25 1/8	29 3/4	37 1/2
E	1 1/4	1	1 1/8	1 3/8	1 3/8	1 3/8	1 1/2	1 1/2	2	2	2	2	2 1/2	2 5/8	2 1/4	3
F	1	1	1 1/2	2 1/4	2 3/8	2 3/8	2	2	2	2	2 1/2	2 1/2	2 1/2	3 3/4	4	3 1/2
G	1	2	2 1/4	2 3/4	3 5/8	3 5/8	5 1/2	5 1/2	5 1/2	6 1/2	7	7	7 1/2	9	11	11
H	2	2	3 1/4	3 3/4	4 3/4	4 3/4	5 1/2	5 1/2	6	7 1/2	7	7	7 1/2	8 3/4	10	11

ANCHORS and CHAINS

DI-LOC CHAIN				CAST STEEL CHAIN				
Weight Anchor Lbs.	Size Inches	Breaking Strength Lbs.	Proof Strength Lbs.	Weight 15 FT.H.	Size Inches	Breaking Strength Lbs.	Proof Strength Lbs.	Weight 15 FT.H.
560	3/4	75000	48000	490	*3 3/4	33880	22680	480
665	13/16				*13 1/16	39872	26600	570
770	7/8	98000	64000	680	*7 7/8	16200	30800	655
875	15/16				*15 1/16	53088	35392	755
1015	1	129000	81000	890	*1	60480	40320	855
1190	1 1/16				*1 1/16	68096	45472	970
1365	1 1/8	161000	106000	1130	*1 1/8	76110	50960	1085
1575	1 3/16				*1 3/16	85120	56840	1215
1785	1 1/4	198000	130000	1400	*1 1/4	94360	63000	1345
2800	1 5/16				*1 5/16	101160	69440	1485
3150	1 3/8	235000	157000	1690	1 3/8	156330	111660	1625
3815	1 7/16				1 7/16	170430	121720	1775
4130	1 1/2	280000	185000	2010	1 1/2	185060	132190	1935
4145	1 9/16				1 9/16	200270	143050	2090
4725	1 5/8	325000	216000	2325	1 5/8	216030	154310	2235
5110	1 11/16				1 11/16	232360	165960	2410
5600	1 3/4	379000	249000	2695	1 3/4	249210	178000	2590
6580	1 13/16				1 13/16	266620	190430	2785
7070	1 7/8	432000	285000	3095	1 7/8	284540	203250	2975
7665	1 15/16				1 15/16	303000	216430	3175
8225	2	488000	322000	3490	2	322000	230000	3355
8855	2 1/16				2 1/16	341510	243930	3570
9415	2 1/8	548000	362000	3935	2 1/8	361530	258240	3785
10015	2 3/16				2 3/16	382060	272910	4015
10640	2 1/4	610000	403000	4415	2 1/4	403100	287930	4245
12005	2 5/16				2 5/16	424630	303320	4485
12710	2 3/8	675000	447000	4915	2 3/8	446660	319050	4725
13370	2 7/16				2 7/16	469180	335130	4960
14105	2 1/2	744000	492000	5475	2 1/2	492190	351560	5265
14805	2 9/16				2 9/16	515670	368340	5535
15575	2 5/8	813000	540000	6050	2 5/8	539620	385440	5815
16345	2 11/16				2 11/16	564040	402890	6105
17990	2 3/4	888000	589000	6660	2 3/4	588930	420660	6405
18900	2 13/16				2 13/16	614260	438760	6705
19810	2 7/8	965000	640000	7295	2 7/8	640070	457190	7015
20685	2 15/16				2 15/16	666340	475940	7330
21560	3	1045000	693000	7955	3	693000	495000	7650

* Wrought iron chain.

The
BROWN TYPE
HYDRAULIC TELEMOOTOR



HYDE WINDLASS COMPANY
BATH, MAINE

No. 25

THE BROWN TYPE TELE MOTOR

THE most recent practice in fitting steam steering gears to steamships, is to place the steering engine directly attached to the rudderhead, thus dispensing with chains or wire ropes leading from the rudderhead to the steering engine amidships, as in the older method. This departure gets rid of the danger connected with the breaking of such chains or ropes, and also the objectionable noise accompanying their working.

With the steering engine close to the rudder, it becomes necessary to have some means of communication between the control valve aft and the steering wheel on the bridge, which latter is situated in many cases very close to the bow of the ship. This is usually carried out by a line of shafting, running in a great number of bearings, and requiring bevel wheels and Hooke's joints when the shafting deviates from the straight line.

In most ships, and particularly in long ships, the friction of this gearing is very considerable, and the steering wheel is consequently very stiff to work. Attention is also required in oiling the various parts, and unless the shafting is very heavy, there is a considerable spring or twist taking place between the wheel on the bridge and the valve gear aft, which tends to irregular steering.

The object of the telemotor is to supply a means of communication as near as possible frictionless, however tortuous the line may be. The method by which this end may be obtained is by a hydraulic device as shown, which is most suitable for the larger class of vessels, where the line of communication has to pass round corners, under decks, etc., for the purpose of avoiding cabins and other important spaces.

In the telemotor, there is an important function performed which, in passing the zero point amidships, causes an automatic adjustment or regulation to take place should the indicator not correspond with the actual position of the rudder.

It is sometimes necessary to set the gear so that this central position does not actually represent the rudder as true fore and aft, but a certain amount of permanent helm is given to counteract the action of the propeller in steering, and this is done by making the connecting links longer or shorter as the case may require.

In some exceptional cases, where it might be inconvenient to adjust the gear by running the indicator into its mid-position by the steering wheel, and so momentarily affecting the straight course of the ship, there is provided a by-pass valve "R" which, when opened, gives a free communication between the upper and lower cylinders, and so allowing the indicator to be brought to zero without moving the rudder aft.

A small tank "O" is provided with a gauge glass at the end. This is usually filled with a mixture of glycerine and water, one part of the former to two or three of the latter. It is very important that the whole system of pipes and cylinders should be fully charged, and that no air should be present.

This being the case, it is necessary to provide for the expansion and contraction of the fluid due to changes of temperature. For this purpose, a valve "I" is fitted at mid-position of the cylinder, a section of which is shown. It contains each an inlet "L" and outlet valve "P". The outlet is simply an ordinary safety-valve loaded above the working pressure, which is about 150 pounds per square inch.

When the temperature rises, as in the case of the sun shining on the pipes, a portion of the fluid is blown through outlet valve "P" into the tank "O," and when the temperature falls, the fluid contracts and takes in the necessary quantity through the inlet valve "L".

The entire telemotor in the pilot house is constructed of gun metal, so as not to affect the compass. The motor-cylinder aft is of similar material, and the pipes are of solid drawn copper, of $\frac{7}{8}$ inch diameter.

They are easily run, and may be bent into any number of corners without in the least adding to the friction of the gear. It will, therefore, be seen that this form of the telemotor, when the ships are large and the line of communication from the bridge to the stern is very irregular and tortuous, is very much to be preferred.

Instructions for Filling, Working, and Adjusting

IT is of the utmost importance in this apparatus that all joints be watertight, as any leakage will empty the small tank "O." After all the pipes are coupled and the connections made to the cylinders and to the tank "O" in the wheelhouse, close the cock underneath the tank and fill to about one-third full with fresh water, and for cold climates add 30 per cent. of refined glycerine, which keeps the parts lubricated and will resist frost to about zero Fahrenheit. (See table of freezing temperatures of various mixtures of water and glycerine.) Put the hand wheel in mid gear, which will be seen by the pointer coming between the two zero marks on indicator. This opens a by-pass between the top and the bottom ends of the cylinder, and allows the whole system to be charged by one operation from the after part of the ship.

Open the valve "A" on the under side of the cylinder "B," after coupling on the discharge pipe "C" from the charging pump "D" the suction pipe "E" being connected to the tank "F," a piece of pipe "G" connecting the valve "H" on top of the cylinder to the tank. The end of this must just come over the filter "X" in tank "F." Open the valve "H" on top and commence pumping, great care being taken that the liquid in tank "F" never gets so low as to allow the pump to draw air, as the good working of the gear depends on the air being expelled. The liquid will shortly be seen to run from the small pipe "G" back into the tank "F;" but the pumping must be continued for some time, say three times as long as it took to begin to come back. By this time the air should have nearly all been driven out, and each stroke of the pump "D" should show a corresponding rush, and not a continuous flow back through the return pipe "G."

Being satisfied as to this, the valve "H" on the top of the cylinder should be closed, and a slight but continuous strain kept on the pump "D." Now go forward to the wheel-house, and on the valve casing cover stop off "I" on the cylinder "J" will be seen a brass plug "K;" remove it and press down the spindle of the inlet valve "L," which is immediately underneath, when the liquid will rush up owing to the pressure being kept on by the pump "D" from aft. When the

casing is quite full and no more air bubbles up, screw in the plug "K." Also the plug "M" on top of forward cylinder should be slackened back to allow any air imprisoned in the cylinder to escape; then tighten up plug "M." Open the valve underneath the tank "O" and close "A" on the under side of the after motor cylinder "B," when the telemotor will be fully charged and ready to use. The tank "O" in the wheel-house should always be kept at least half full, and the valve on the bottom of it must always be open when the telemotor is in use.

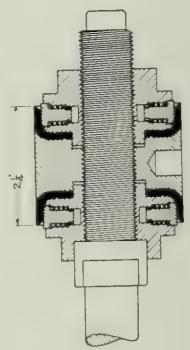
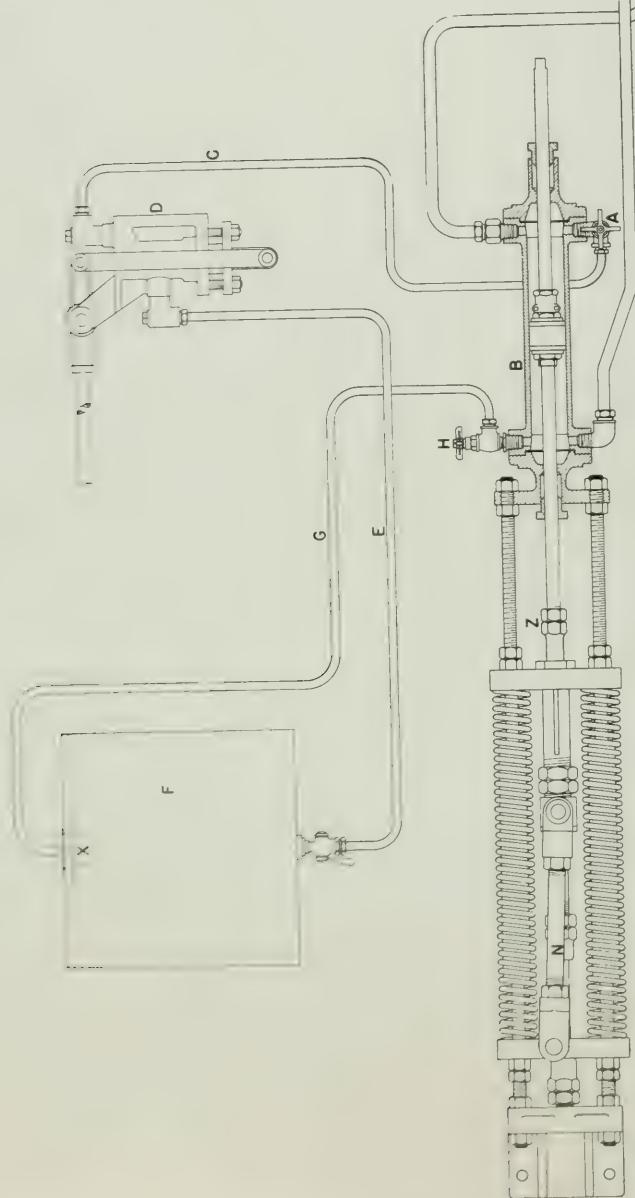
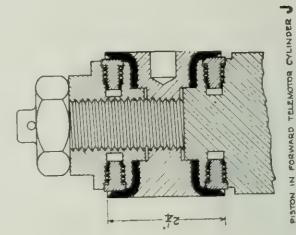
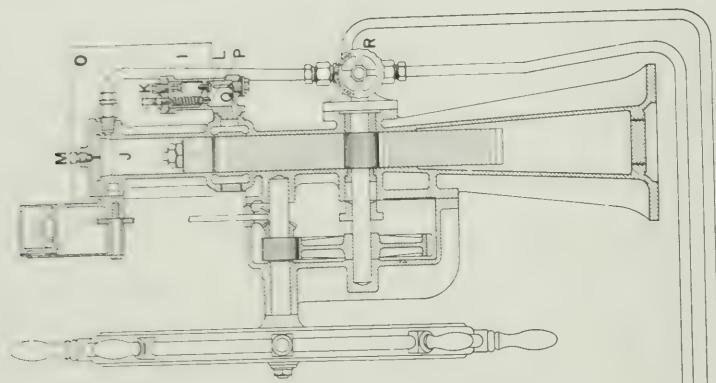
The gear may now be tried by putting the wheel over to port and starboard, and noticing aft if a corresponding movement takes place in the piston of the after motor cylinder. Should it not respond on one side or the other, than an internal leakage may be suspected; in which case examine the leathers in telemotor and motor cylinder.

The inlet and outlet valves "L" and "P" are not working valves, but merely open and close as occasion requires, to allow for expansion and contraction of the fluid in the pipes, due to change of temperature.

The leathers in the pistons themselves will not cause any trouble until actually worn out, and even when in a leaky condition will work quite well and keep in correspondence with the gear aft in virtue of the spring always putting the gear into the central position when the forward piston enters the by-pass portion of the cylinder.

After having made any repairs that may be necessary, and before re-charging, it is advisable to clean out the pocket "Q" that is placed underneath the valve casing "I" on the bridge telemotor, for the purpose of collecting any dirt or sediment that may be in the liquid. This is done by removing the brass plug in the bottom, when the small quantity of liquid that flows out of the pocket will carry anything with it. "X" is a small portable filter to prevent dirt or other foreign matter from getting into the system, and it should always be in place when pumping up or filling the tank.

It frequently happens that owing to the action of the propeller, the ship requires a few degrees of port or starboard helm, which will be shown by



the indicator on the bridge. If this is so, the connecting rod "N" to the steering gear valve should be lengthened or shortened as the case may be, and the spring aft will then, when adjusting, give the necessary permanent bias to the rudder, while the indicator on the bridge will show the gear amidships — that is, steering as if the propeller had no influence on the ship's course.

The capacity of the telemotor apparatus on the bridge is nearly double that of the motor cylinder aft, so that the ship could be steered on a course quite well when the indicator showed 45°, and the rudder fore and aft. This might happen with a very leaky and worn-out leather, but still the ship could be steered perfectly.

If the wheel is put to zero by the indicator, the gear aft will immediately get into correspondence, although for a moment the ship would be put slightly off her course. In confined waters or tortuous passages, in such an emergency the hand-by-pass valve "R" can be used to effect the same object without interfering with the steering of the ship, by opening it and running the wheel to zero, care being taken to close it again. This, however, should never be used unless absolutely necessary, as quartermasters may try it out of curiosity, and, of course, if they leave the valve open, the communication from the bridge to the gear aft becomes inoperative.

So far as is known this valve has not been required for this purpose, but is placed there in view of an emergency as indicated above, and so that, when in dock or other place when the gear is not being used, it may be opened and the wheel can then be moved from hard-over to hard-over without doing any injury to the gear.

In addition to the stuffing box of this valve, there are only three more — one on the cylinder on the bridge and two aft — and as the water pressure never exceeds 250 lbs. per square inch, there is no reason for any serious loss of the fluid in the tank. Keep the stuffing boxes *full* of greasy cotton packing, and screw up as tightly as is necessary to secure *tightness* but not *stiffness*. It is advisable to occasionally examine the leathers in the telemotor and motor cylinder aft when the ship is in port. The necessity for this can be ascertained by pulling the steering wheel hard over to port, and securing it there. The motor cylinder will

be found to have responded to the same extent. If the gear is now left, say for half an hour, the spring at the motor cylinder will have moved the piston towards the midship position if there is any leakage in these leathers. A similar trial may be made to starboard, which will test these leathers. To examine the leathers in the forward cylinder, it is only necessary to open the by-pass valve "R," remove the nuts from the cylinder cover, and then turn the piston right up by means of the hand wheel. In the case of the after leathers, let go the large nuts "Z," remove back cylinder cover and push piston out, closing the circuit valves to prevent loss of fluid. The circuit valve on back end of cylinders should be closed before removing the cover, and the other one after the piston is out.

It need not be required that these leathers should be absolutely tight, but the motor piston should remain over for, say, ten minutes without any serious movement toward midship position, that being about the maximum time that, in practice, a helm would be held hard-over; and so any little deviation due to leaky leathers would be at once adjusted when the steering wheel is put to amidships, the motor springs putting the gear back to zero, through the by-pass allowing the free circulation of the fluid.

Care should be taken to lubricate with good oil the various working parts of the gear.

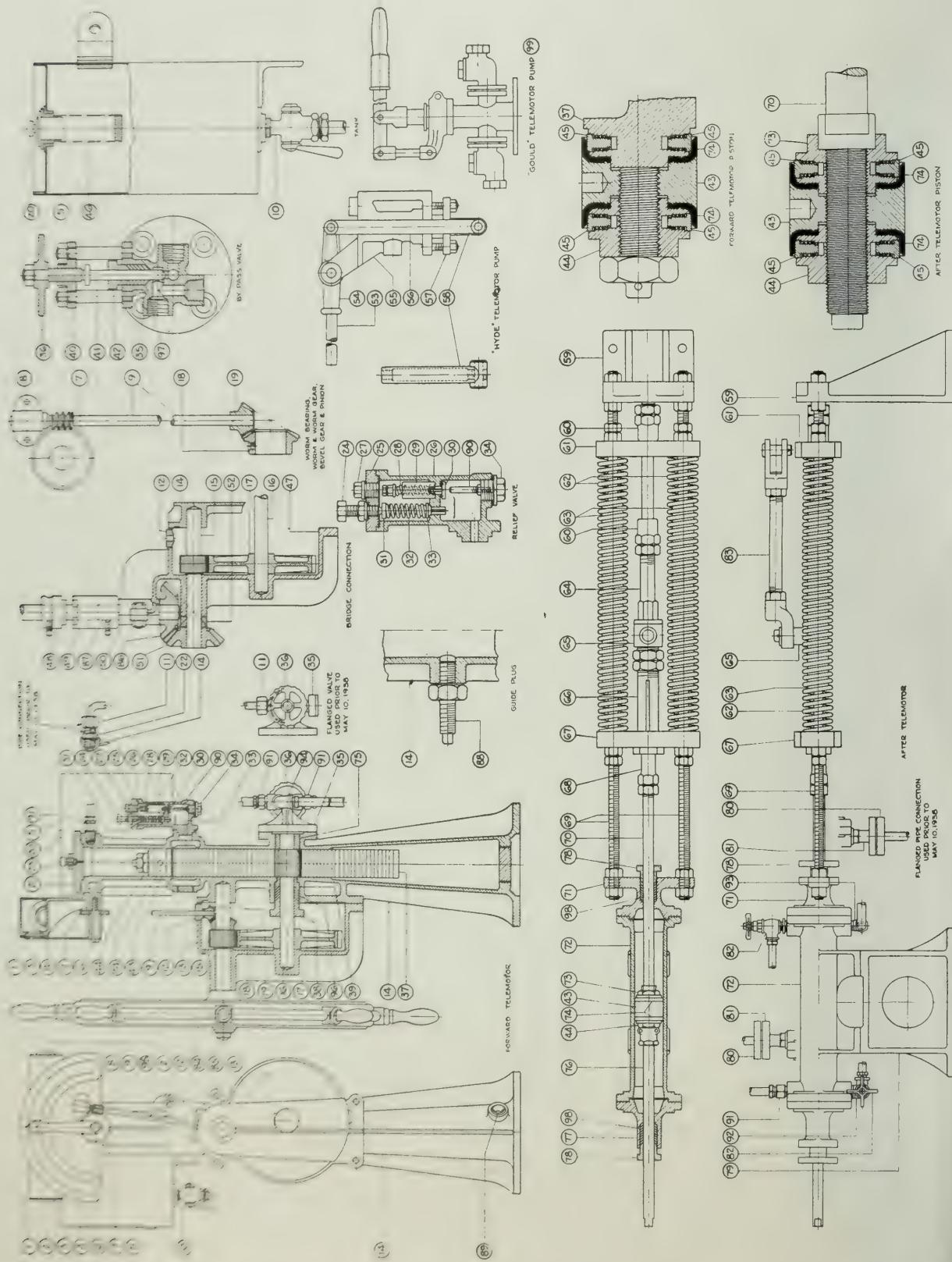
Great care should be taken when fitting new leathers to the transmitting cylinder that have not been obtained direct from Hyde Winifress Company, that these leathers are not longer over their edges than shown on illustration, or the automatic by-pass will be rendered ineffective.

Opening valve "R" will assist charging system quickly but valve "R" must be kept closed when telemotor is in operation.

Nox Zinc Oxide Fittings for Telemotors

Water containing Refined Glycerine.	Safe to work at Fahrenheit
25°	10°
33°	10°
50°	20°
60°	30° getting thick.
70°	Too thick to work at 25°

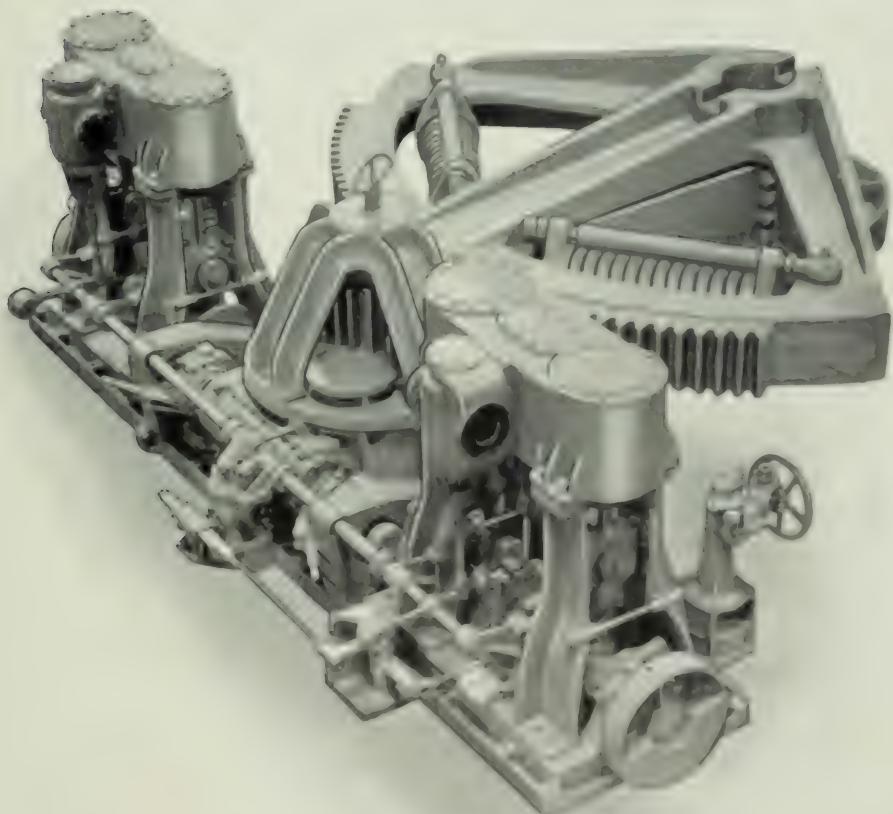
Telemotor oil of viscosity 100 to 100 and
minus zero point is also used.



LIST OF PARTS

1. INDICATOR PLATE	34. PIPE PLUG	67. SPRING BEARING YOKE
2. ELECTRIC LIGHT HOLDER	35. BY-PASS VALVE	68. STOP NUT
3. INDICATOR PLATE COVER	36. HAND WHEEL	69. SIDE ROD
4. POINTER	37. PINION RACK	70. PISTON ROD SECTION, 25 $\frac{1}{4}$ " LONG
5. TANK WITH BRACKETS	38. GLAND	71. CYLINDER COVER, STUFFING BOX AND YOKE
6. INDICATOR WORM BEARING	39. GLAND BUSHING	72. AFTER TELE MOTOR CYLINDER
7. INDICATOR WORM GEAR	40. CONTROLLING NUT	73. PISTON END
8. INDICATOR WORM BEARING	41. VALVE ROD	74. PISTON LEATHER
9. INDICATOR WORM AND SHAFT	42. VALVE GLAND	75. BUSHING
10. STOP COCK COMPLETE	43. PISTON CENTER	76. PISTON ROD SECTION, 19 $\frac{1}{4}$ " LONG
11. PACKING NUT	44. PISTON END	77. CYLINDER COVER AND STUFFING BOX
12. INDICATOR WORM SHAFT CAP	45. SEGMENT OF PISTON RING	78. STUFFING BOX GLAND
13. SPUR GEAR CASING AND BEARING	46. STRAINER COMPLETE	79. CYLINDER BRACKET
14. FORWARD TELE MOTOR CYLINDER AND STAND	47. SPUR GEAR CASING AND BEARING WITH BRACKET AND BEARING FOR OVER-HEAD CONNECTION	80. PIPE FITTING
15. SPUR PINION AND SHAFT	48. CLUTCH, UPPER PART	81. NIPPLE
16. RACK PINION AND SHAFT	49. CLUTCH, LOWER PART	82. CYLINDER STOP VALVE, COMPLETE
17. SPUR GEAR	50. BEARING CAP	83. CONNECTING LINK
18. INDICATOR WORM SHAFT BEVEL GEAR	51. MITER GEAR ON HORIZONTAL SHAFT	84. WOOD STEERING WHEEL
19. INDICATOR WORM SHAFT BEVEL PINION	52. COLLAR	85. STEERING WHEEL NUT
20. STRAINER PLUG	53. HANDLE	86. MITER GEAR ON VERTICAL SHAFT
21. FORWARD TELE MOTOR CYLINDER COVER	54. HANDLE SOCKET	87. OVERHEAD CONNECTION SHAFT
22. COUPLING	55. PUMP BODY	88. GUIDE PLUG
23. COUPLER PLUG	56. SIDE LINK	89. BASE PLUG
24. ESCAPE VALVE SET SCREW	57. PUMP BODY STUFFING GLAND	90. SUCTION VALVE STOP
25. RELIEF VALVE HEAD	58. PLUNGER	91. COUPLING
26. RELIEF VALVE BODY	59. SIDE ROD BRACKET	92. SPECIAL STREET ELL
27. SUCTION VALVE PIPE PLUG	60. STOP NUT	93. ELBOW
28. SUCTION VALVE SPRING	61. SPRING BEARING YOKE	94. ELBOW
29. SUCTION VALVE FERRULE	62. SPRING	95. ELBOW
30. SUCTION VALVE	63. SIDE ROD SLEEVE	96. PINION SHAFT PACKING
31. ESCAPE VALVE UPPER PART	64. PISTON ROD SECTION, 35 LONG	97. BY-PASS VALVE PACKING
32. ESCAPE VALVE SPRING	65. PISTON ROD KNUCKLE	98. PISTON ROD PACKING
33. ESCAPE VALVE LOWER PART	66. PISTON ROD SLIDE	99. GOULD TELE MOTOR PUMP

HYDE
STEAM STEERING GEAR
STEAM WINDLESS
STEAM WARPING WINCH
Standard Oil Types
Installed on
U.S.S. AO 23 Class and U.S.S. AO 51 Class



HYDE WINDLESS COMPANY
Bath, Maine

No. 26

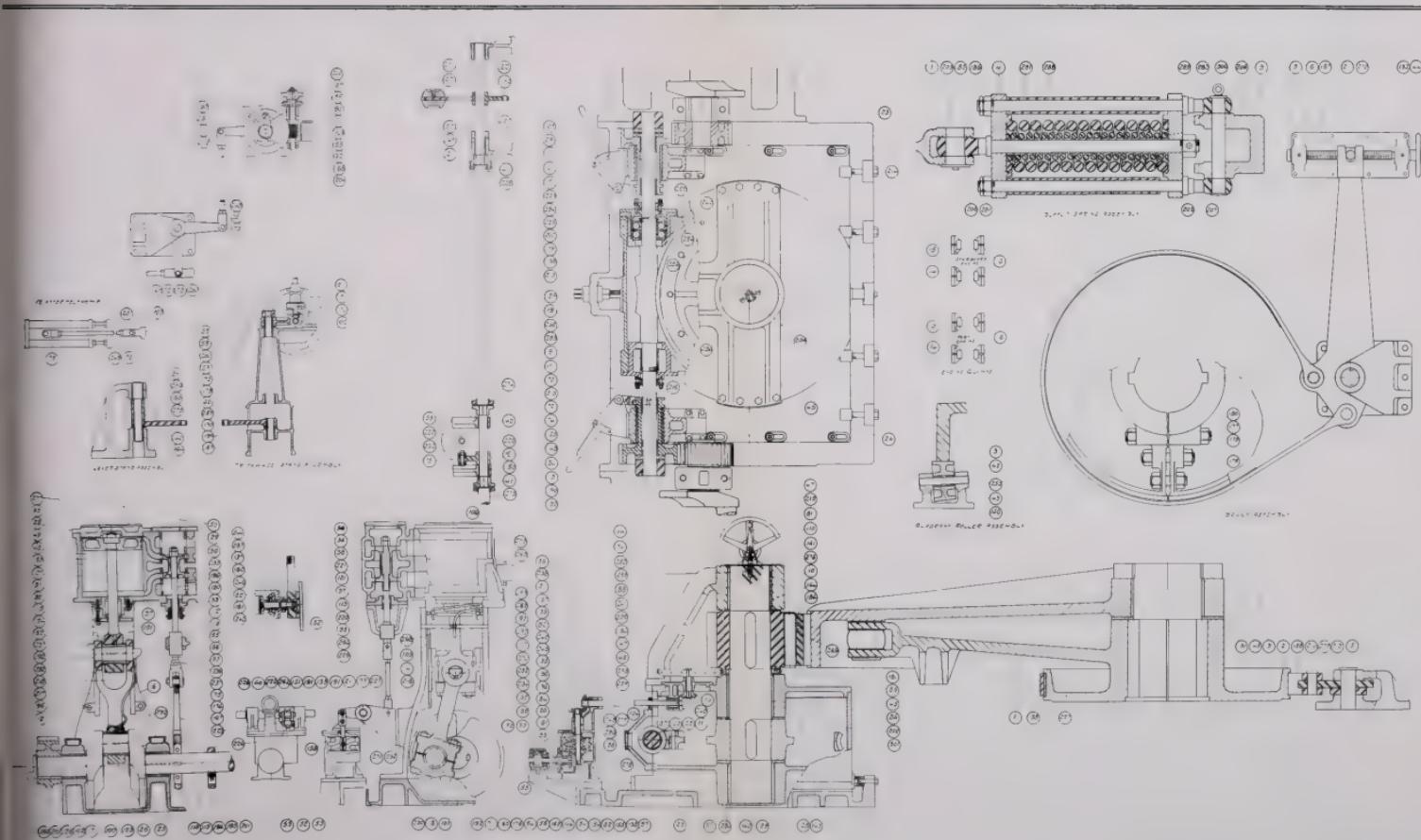
HYDE STEAM STEERING GEAR

Quadrant Type

THE STEERING GEAR illustrated on cover and shown in sectional views by line cut on pages 3 and 4, with list of parts on page 5, is equipped with two 16" x 12" vertical engines. The engines are connected through spur gearing to worm shaft and clutches are provided for disconnecting either engine. One engine is capable of steering the ship at full speed, putting the rudder from hardover to hardover in 30 seconds. In case of emergency steering gear being used, the pinion in mesh with the quadrant can be disconnected by slackening off bolts in base of gear housing and jacking the gear housing forward by means of a screw. Hydraulic telemotor transmission is used for operating the steering engine control which is of the full travel, follow-up type. Tiller is keyed to rudder stock and the quadrant free to turn on same. Springs are interposed between tiller and quadrant. These springs are intended to relieve any shock which might come on rudder caused by vessel backing into mud or heavy sea striking the rudder.

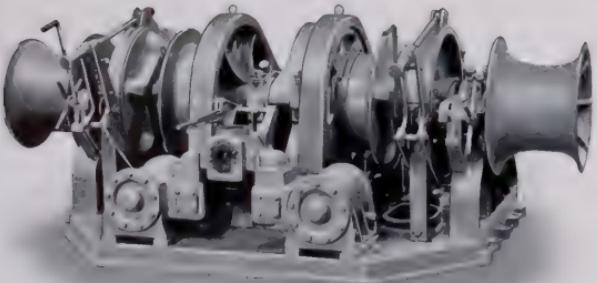
LUBRICATION

Tiller	Grease	Medium Grade
Gear Teeth	Gear Grease	
Worm Gear Casing	Oil	S.A.E. 160
Differential Gear Casing	Oil	S.A.E. 40
Crank Shaft Bearings	Oil	S.A.E. 40
Main Pinion Shaft Bearings	Grease	Medium Grade
Clutch Bearing	Grease	Medium Grade
Control Shaft Bearings	Grease	Medium Grade
Crank Pins	Mechanical Oilers on Engine	
Wrist Pins	Compounded Marine Engine	
Crosshead Slides	Oil	N.D. Spec. 4065
Eccentrics	Oil	S.A.E. 40
Valve Stem Guides	Oil	S.A.E. 40



LIST OF PARTS

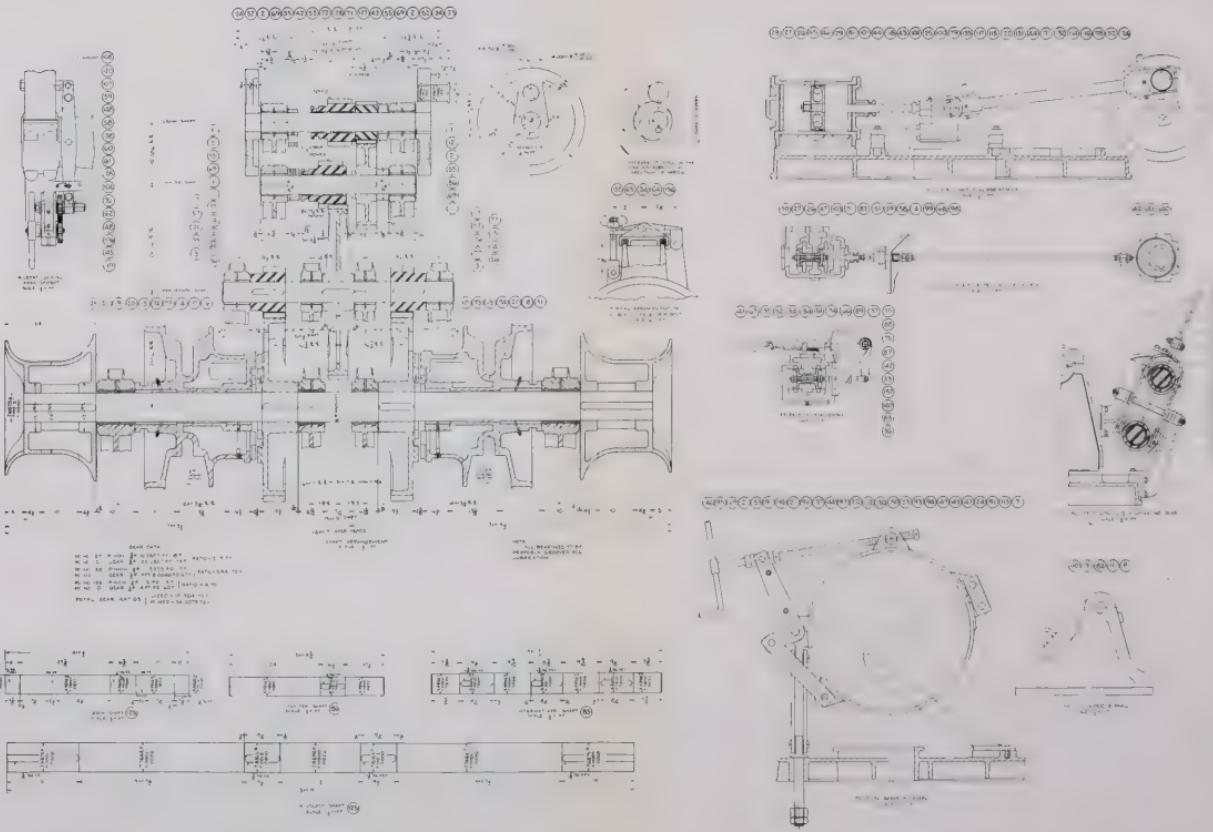
HYDE STEAM WINDLASS



THE STEAM WINDLASS is illustrated above and shown in sectional views by line cuts on pages 7 and 8. The details of its operation are given on page 9. The engine is 12" x 15", reversible by means of a reversing valve and is capable of hoisting both an hour and chains simultaneously at an average speed of 30 feet per minute. The change gears on crank and intermediate shaft allow for two speeds for handling lines on the warping gypsys: 30 feet per minute for warping and 60 feet per minute for taking in slack line. The wildcats are designed for handling 22" stud-link chain. Each wildcat has a locking gear operated by hand wheel and is fitted with brake band operated by hand crank.

LUBRICATION

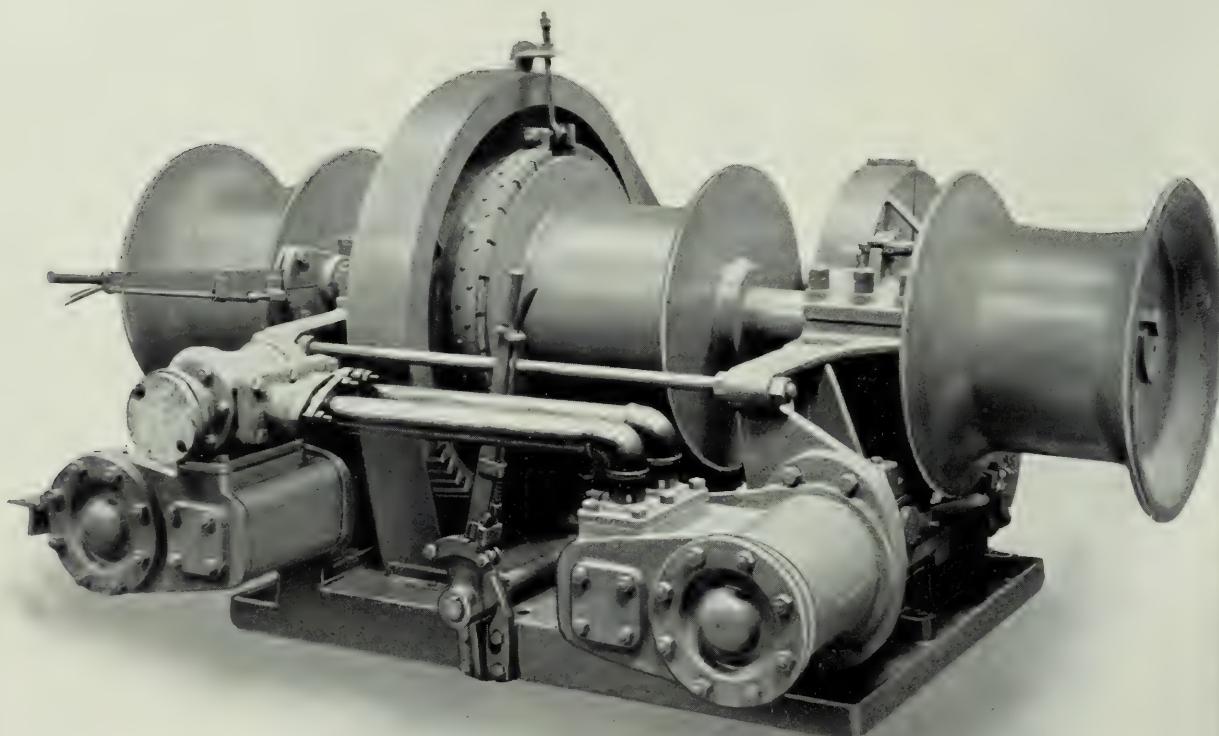
Windlass, Intermediate and Crank Shaft Bearings	Oil	S.A.E. 40
Crank Pins		
Wrist Pins		
Crosshead Slides	Compounded Marine Engine Oil	N. D. Spec. 1065
Piston Rods and Valve Stems		
Valve Stem Guides		
Pinion Bushings		
Wildcat Bushings	Grease	Medium Grade
Friction Brake Mechanism		
Wildcat Locking Mechanism		
Eccentrics		
Gear Teeth	Gear Grease	
Reverse Valve Control	Oil	S.A.E. 40
Clutch Operating Mechanism	Oil	S.A.E. 10



LIST OF PARTS

PC. NO.	DESCRIPTION	PC. NO.	DESCRIPTION
1. CRANK & COUNTER SHAFT BEARING		80. CLUTCH SWIVEL	
2. CRANK & COUNTER SHAFT BEARING CAP		81. PISTON ROD GLAND	
3. INTERMEDIATE SHAFT BEARING		82. PISTON VALVE STEM GLAND	
4. INTERMEDIATE SHAFT BEARING CAP		83. REVERSE VALVE STEM GLAND (1/2 B)	
5. OIL BOX		84. CHAIN STOPPER PAWL PIN	
6. BED PLATE (PORT HALF)		85. INTERMEDIATE SHAFT	
7. BED PLATE (STARBOARD HALF)		86. COUNTER SHAFT	
8. CHAIN STOPPER BODY		87. CONTROL SHAFT	
9. CHAIN STOPPER PAWL		88. COLLAR	
10. MAIN SPUR GEAR		89. QUADRANT DISTANCE PIECE	
11. SPUR GEAR		90. PIN	
12. SPUR GEAR		91. PIN	
13. WILDCAT		92. PIN	
14. CENTER BITT		93. FRICTION ROD NUT	
15. CENTER BITT		94. COLLAR	
16. BEARING CAP		95. COLLAR	
17. BEARING CAP		96. PIN	
18. SIDE BITT WITH BRACKET		97. PIN	
19. SIDE BITT WITH BRACKET		98. ECCENTRIC ROD	
20. SIDE BITT BEARING CAP		99. VALVE STEM KNUCKLE PIN	
21. FRICTION ANCHOR LUG		100. CROSHEAD PIN	
22. BELL CRANK LUG		101. PISTON ROD	
23. FRICTION ROD NUT LUG		102. PISTON ROD SPECIAL NUT	
24. HINGE LUG		103. VALVE STEM	
25. CROSHEAD		104. GEAR	
26. CYLINDER		105. SCREW LOCKING SHAFT	
27. CYLINDER		106. HANDWHEEL SHAFT	
28. CYLINDER COVER		107. FULCRUM PIN	
29. CYLINDER COVER & STUFFING BOX		108. LOCKING LEVER FULCRUM BOLT	
30. STEAM CHEST COVER		109. FULCRUM PIN	
31. VALVE STEM STUFFING BOX		110. CHAIN STOPPER PAWL LIFTING EYE	
32. REVERSE VALVE BODY		111. CHAIN STOPPER STOP	
33. REVERSE VALVE HEAD		112. FRICTION ANCHOR LINK	
34. REVERSE VALVE		113. HINGE LINK	
35. CONTROL SHAFT BEARING		114. GIB (CRANK END)	
36. CONTROL SHAFT BEARING		115. GIB (CROSHEAD END)	
37. QUADRANT		116. KEY (CRANK END)	
38. VALVE STEM GUIDE		117. KEY (CROSHEAD END)	
39. VALVE STEM GUIDE COVER		118. CROSHEAD SLIDE	
40. ECCENTRIC STRAP (HALF)		119. WASHER	
41. ECCENTRIC STRAP (HALF)		120. LOCKING LEVER FULCRUM	
42. ECCENTRIC SHEAVE		121. BELL CRANK	
43. CROSHEAD GIB		122. CROSHEAD CAP	
44. CROSHEAD SLIDE SUPPORT		123. CRANK SHAFT	
45. PISTON		124. CRANK PIN	
46. PISTON RING		125. WINDLASS SHAFT	
47. PISTON VALVE		126. MAIN SPUR PINION	
48. SCREW LOCKING SHAFT BEARING		127. PINION, 18 TEETH	
49. FULCRUM PIN BRACKET		128. PINION, 17 TEETH	
50. FULCRUM PIN BRACKET		129. BELL CRANK BRUNNION	
51. HEAD		130. FRICTION ANCHOR BOLT	
52. CRANK DISK		131. CONNECTING ROD	
53. COLLAR		132. CONNECTING ROD STRAP (CRANK END)	
54. OIL BOX COVER		133. CONNECTING ROD STRAP (CROSHEAD END)	
55. LINER		134. LATCH	
56. LINER		135. LATCH ROD	
57. LINER		136. LATCH ROD GUIDE	
58. LOCKING PIN		137. BELL CRANK LINK	
59. YOKE (HALF)		138. LOCKING LEVER QUADRANT	
60. GIB		139. QUADRANT (COMPLETE)	
61. FLOATING NUT		140. REVERSE VALVE STEM	
62. WASHER		141. REVERSE VALVE LEVER	
63. TOGGLE PIN		142. REVERSE VALVE ARM	
64. OIL BOX COVER BINDER		143. CHAIN CLEARER	
65. OIL BOX DROP BOLT		144. BELL CRANK PIN	
66. LATCH GUIDE		145. LOCKING HANDWHEEL	
67. LEVER GRIP		146. FRICTION ROD CRANK	
68. VALVE STEM KNUCKLE		147. FRICTION ROD WIRE	
69. BEARING BOX		148. LOCKING LEVER (COMPLETE)	
70. BEARING BOX		149. CLUTCH LEVER (COMPLETE)	
71. BUSHING		150. FRICTION ROD	
72. BUSHING		151. VALVE STEM GUIDE JEWEL	
73. BUSHING		152. DISTANCE PIECE	
74. BUSHING		153. DISTANCE PIECE	
75. BUSHING		154. LATCH SHROUD	
76. BUSHING		155. THUMB NUT	
77. BEARING BOX		156. IN JOURNAL PAVING, JEWELING, & REVERSE VALVE STEM KNUCKLE PIN	
78. CRANK PIN BOX (HALF)		157. REVERSE VALVE STEM KNUCKLE PIN	
79. CROSHEAD PIN BOX (HALF)			

STEAM WARPING WINCH



THE WARPING WINCH illustrated above and shown in sectional views by line cuts on page 11 and parts list on page 12 has 9" x 12" engines fitted with reversing valve. This winch is of the compound geared type with clutches provided on the crank and intermediate shaft in order to change from one speed to the other. The drum shown in photograph is omitted, but shaft is extended on each side having gypsies 20" diameter and drums grooved for $\frac{3}{4}$ " wire rope used for emergency steering. This winch has a capacity of 16,000 lbs. at 100 feet per minute.

LUBRICATION

Crank, Intermediate, Main and Head Shaft		
Bearings	Oil	S.A.E. 40
Crank Pins		
Wrist Pins	Compounded Marine Engine	
Crosshead Slides	Oil	N. D. Spec. 4065
Piston Rods and Valve Stems		
Valve Stem Guides		
Pinion Bushings		
Clutches	Grease	Medium Grade
Eccentrics		
Reverse Valve Control		
Clutch Operating Mechanism		

ANCHORS and CHAINS

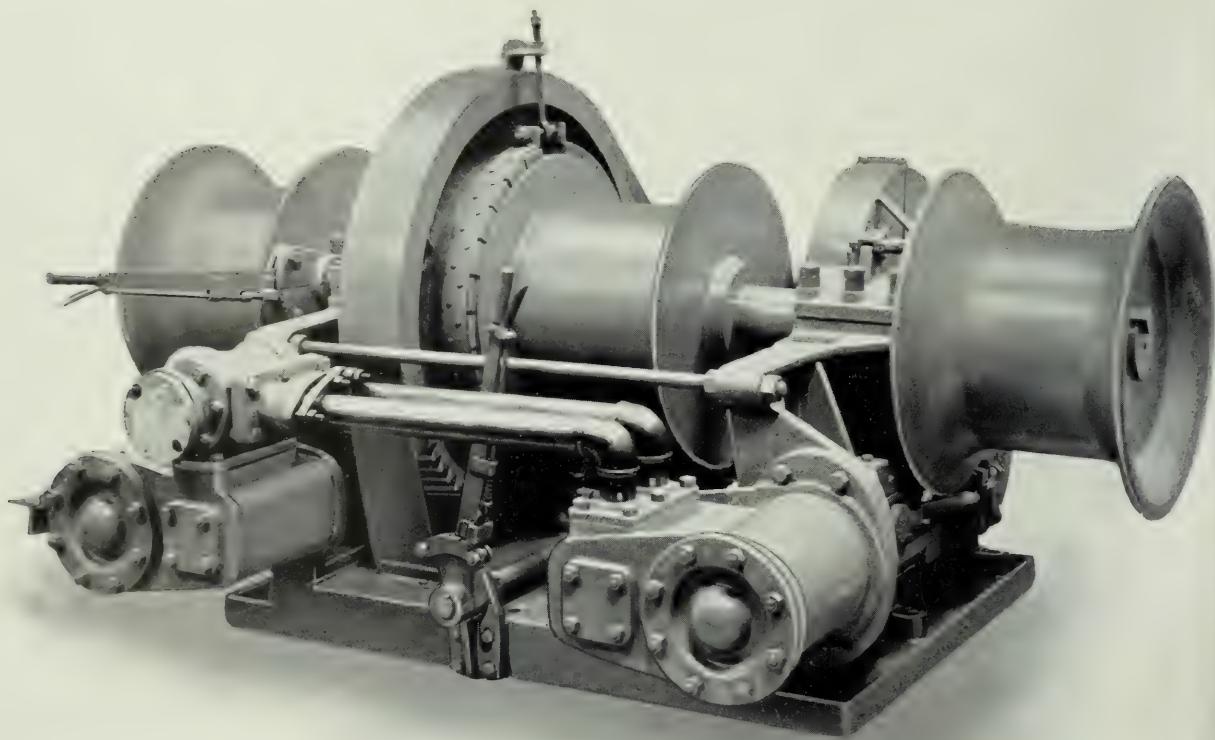
DI-LOC CHAIN

CAST STEEL CHAIN

Weight Anchor Lbs.	Size Inches	Breaking Strength Lbs.	Proof Strength Lbs.	Weight 15 FT H.	Size Inches	Breaking Strength Lbs.	Proof Strength Lbs.	Weight 15 FT H.
560	3 1/4	7500	18000	190	*3 1/4	33880	22680	180
665	13 1/16				*13 1/16	39872	26600	570
770	7 8	98000	64000	680	*7 8	16200	30800	655
875	15 1/16				*15 1/16	53088	35392	755
1015	1	129000	84000	890	*1	60480	40320	855
1190	1 1/16				*1 1/16	68096	45472	970
1365	11 8	161000	106000	1130	*11 8	76440	50960	1035
1575	13 1/16				*13 1/16	85120	56840	1215
1785	11 1/4	198000	130000	1400	*11 1/4	94360	63000	1345
2800	15 1/16				*15 1/16	104160	69440	1485
3150	13 8	235000	157000	1690	13 8	156330	111660	1625
3815	17 1/16				17 1/16	170430	121720	1775
4130	11 1/2	280000	185000	2010	11 1/2	185060	132190	1935
4415	19 1/16				19 1/16	200270	143050	2090
4725	15 8	325000	216000	2325	15 8	216030	154310	2235
5110	11 1/16				11 1/16	232360	165960	2410
5600	13 1/4	379000	219000	2695	13 1/4	249210	178000	2590
6580	113 1/16				113 1/16	266620	190430	2785
7070	17 8	432000	285000	3095	17 8	284540	203250	2975
7665	115 1/16				115 1/16	303000	216430	3175
8225	2	488000	322000	3490	2	322000	230000	3355
8855	21 1/16				21 1/16	341510	243930	3570
9415	21 8	548000	362000	3935	21 8	361530	258240	3765
10045	23 1/16				23 1/16	382060	272910	4015
10640	21 1/4	610000	403000	4415	21 1/4	403100	287930	4245
12005	25 1/16				25 1/16	424630	303320	4435
12740	23 8	675000	447000	4915	23 8	446660	319050	4725
13370	27 1/16				27 1/16	469180	335130	4960
14105	21 1/2	744000	492000	5475	21 1/2	492190	351560	5265
14805	29 1/16				29 1/16	515670	368340	5535
15575	25 8	813000	540000	6050	25 8	539620	385440	5815
16345	211 1/16				211 1/16	564040	402890	6105
17990	23 1	888000	589000	6660	23 1	588930	420660	6405
18900	213 1/16				213 1/16	614260	438760	6705
19810	27 8	965000	640000	7295	27 8	640070	457190	7045
20685	215 1/16				215 1/16	666310	475940	7330
21560	3	1045000	693000	7955	3	693000	495000	7650

* Wrought iron chain

STEAM WARPING WINCH



THE WARPING WINCH illustrated above and shown in sectional views by line cuts on page 11 and parts list on page 12 has 9" x 12" engines fitted with reversing valve. This winch is of the compound geared type with clutches provided on the crank and intermediate shaft in order to change from one speed to the other. The drum shown in photograph is omitted, but shaft is extended on each side having gypsys 20" diameter and drums grooved for $\frac{3}{4}$ " wire rope used for emergency steering. This winch has a capacity of 16,000 lbs. at 100 feet per minute.

LUBRICATION

Crank, Intermediate, Main and Head Shaft

Bearings	Oil	S.A.E. 40
Crank Pins		
Wrist Pins	Compounded Marine Engine	
Crosshead Slides	Oil	N. D. Spec. 4065
Piston Rods and Valve Stems		
Valve Stem Guides		
Pinion Bushings		
Clutches	Grease	Medium Grade
Eccentrics		
Reverse Valve Control		
Clutch Operating Mechanism		

LIST OF PARTS

NO.	DESCRIPTION	NO.	DESCRIPTION
1	CYLINDER	46	REVERSE VALVE
2	CYLINDER	47	REVERSE VALVE LEVER
3	CYLINDER HEAD	48	REVERSE VALVE LEVER ARM
4	STEAM CHEST COVER	49	REVERSE VALVE LEVER GUIDE
5	PISTON ROD STUFFING BOX	50	REVERSE VALVE LEVER
6	PISTON ROD STUFFING BOX GLAND	51	REVERSE LEVER LATCH
7	PISTON HALF	52	REVERSE LEVER LATCH ARM
8	PISTON PING	53	REVERSE LEVER LATCH GUIDE
9	PISTON ROD	54	REVERSE LEVER LATCH LEVER
10	REVERSE VALVE LINER	55	REVERSE LEVER LATCH LEVER ARM
11	CROSSHEAD	56	REVERSE LEVER LATCH LEVER GUIDE
12	CROSSHEAD BOX HALF	57	REVERSE LEVER LATCH LEVER LEVER
13	CROSSHEAD BOX HALF	58	REVERSE LEVER LATCH LEVER LEVER ARM
14	CROSSHEAD SLIDES	59	REVERSE LEVER LATCH LEVER GRIP
15	CROSSHEAD BINDER	60	REVERSE LEVER LATCH LEVER GRIP
16	CONNECTING ROD BOX HALF	61	REVERSE LEVER LATCH LEVER GRIP
17	CONNECTING ROD BOX HALF	62	REVERSE LEVER LATCH LEVER GRIP
18	CONNECTING ROD	63	REVERSE LEVER LATCH LEVER GRIP
19	CONNECTING LINK	64	REVERSE LEVER LATCH LEVER GRIP
20	CRANK DISK	65	REVERSE LEVER LATCH LEVER GRIP
21	CRANK PIN	66	REVERSE LEVER LATCH LEVER GRIP
22	PISTON VALVE	67	REVERSE LEVER LATCH LEVER GRIP
23	VALVE STEM	68	REVERSE LEVER LATCH LEVER GRIP
24	VALVE STEM KNUCKLE	69	REVERSE LEVER LATCH LEVER GRIP
25	VALVE STEM STUFFING BOX	70	REVERSE LEVER LATCH LEVER GRIP
26	VALVE STEM STUFFING BOX GLAND	71	REVERSE LEVER LATCH LEVER GRIP
27	VALVE STEM GUIDE	72	REVERSE LEVER LATCH LEVER GRIP
28	VALVE STEM GUIDE CAP	73	REVERSE LEVER LATCH LEVER GRIP
29	ECCENTRIC ROD	74	REVERSE LEVER LATCH LEVER GRIP
30	ECCENTRIC SHEAVE	75	REVERSE LEVER LATCH LEVER GRIP
31	ECCENTRIC STRAP (HALF)	76	REVERSE LEVER LATCH LEVER GRIP
32	ECCENTRIC STRAP (HALF)	77	REVERSE LEVER LATCH LEVER GRIP
33	REVERSE VALVE BODY	78	REVERSE LEVER LATCH LEVER GRIP
34	REVERSE VALVE HEAD	79	REVERSE LEVER LATCH LEVER GRIP

ANCHORS and CHAINS

DE-LOC CHAIN					CAST STEEL CHAIN				
Weight Anchor Lbs.	Size Inches	Breaking Strength Lbs.	Proof Strength Lbs.	Weight 15 FT.H.	Size Inches	Breaking Strength Lbs.	Proof Strength Lbs.	Weight 15 FT.H.	
560	3 1/4	7500	18000	190	*3 1/4	33830	22680	180	
665	13 16				*4 1/2 16	39872	26600	570	
770	7 8	93000	64000	680	*7 8	46200	30300	655	
875	15 16				*15 16	53088	35392	755	
1015	1	129000	84000	890	*1	60480	40320	855	
1190	11 16				*11 16	68096	45172	970	
1365	11 8	161000	106000	1130	*11 8	76140	50960	1085	
1575	13 16				*13 16	85120	56840	1215	
1785	11 4	198000	130000	1400	*11 4	94360	63000	1345	
2800	15 16				*15 16	104160	69440	1485	
3150	13 8	235000	157000	1690	13 8	156330	111660	1625	
3815	17 16				17 16	170430	121720	1775	
4130	11 2	280000	185000	2010	11 2	185060	132190	1935	
4445	19 16				19 16	200270	143050	2090	
4725	15 8	325000	216000	2325	15 8	216030	154310	2235	
5110	11 16				11 16	232360	165960	2410	
5600	13 4	379000	249000	2695	13 4	249210	178000	2590	
6580	13 16				13 16	266620	190430	2785	
7070	17 8	432000	285000	3095	17 8	284540	203250	2975	
7665	11 5 16				11 5 16	303000	216430	3175	
8225	2	488000	322000	3490	2	322000	230000	3355	
8855	21 16				21 16	341510	243930	3570	
9415	21 8	548000	362000	3935	21 8	361530	258240	3785	
10045	23 16				23 16	382060	272910	4015	
10640	21 4	610000	403000	4115	21 4	403100	287930	4245	
12005	25 16				25 16	421630	303320	4485	
12740	23 8	675000	447000	4915	23 8	446660	319050	4725	
13370	27 16				27 16	469180	335130	4960	
14105	21 2	744000	492000	5475	21 2	492190	351560	5265	
14805	29 16				29 16	515670	368340	5535	
15575	25 8	813000	540000	6050	25 8	539620	385440	5815	
16345	21 1/2 16				21 1/2 16	564040	402890	6105	
17990	23 4	888000	589000	6660	23 4	588930	420660	6405	
18900	21 3 16				21 3 16	614260	438760	6705	
19810	27 8	965000	640000	7295	27 8	640070	457190	7015	
20685	21 5 16				21 5 16	666310	475940	7330	
21560	3	1015000	693000	7955	3	693000	495000	7650	

* Wrought iron chain.

HYDE
STEAM AND ELECTRIC
DRUM STEERERS

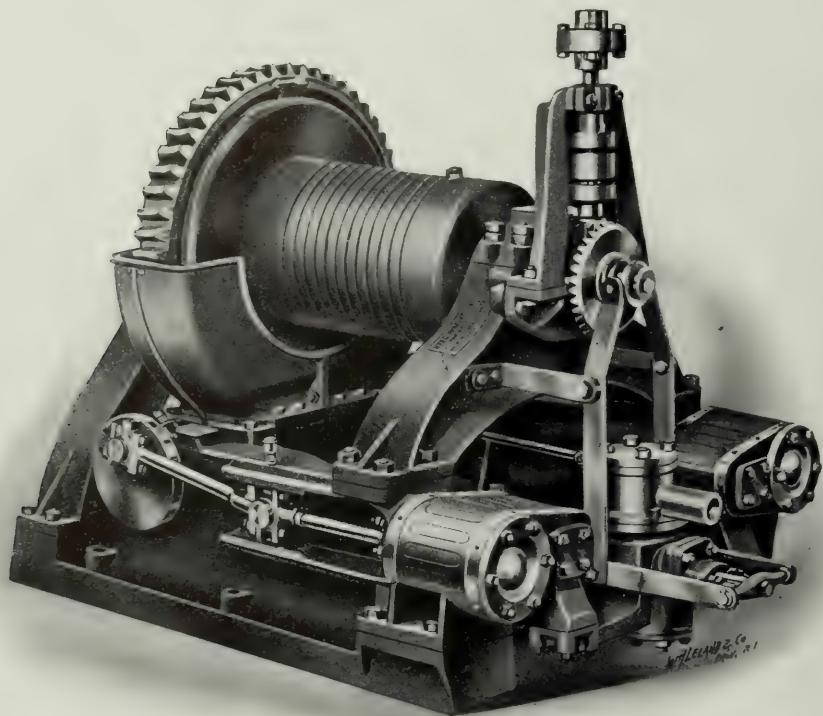


HYDE WINDLASS COMPANY

Bath, Maine

No. 27

HYDE STEAM STEERER



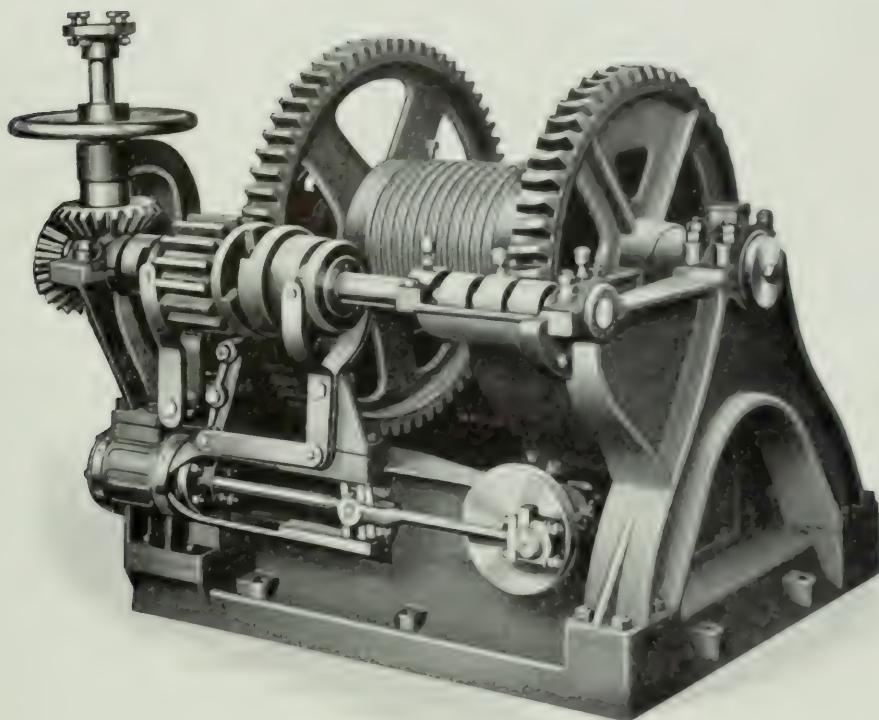
FOR small steamships this engine is a standard type. It is very compact and on account of the small space occupied, can be located in almost any convenient position on board ship, the shaft from steering stand in pilot house connecting to the vertical shaft at steering engine. The drum of steering engine is grooved for chains or wire rope which can be led vertically up or directly down through the engine bed, connecting to the quadrant chains or ropes.

These engines are furnished in the following sizes:

3½" diameter by 3½" stroke.

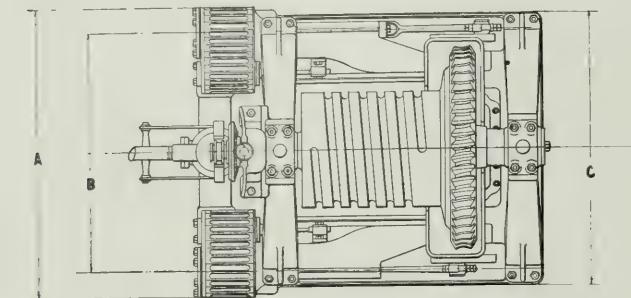
1"	"	"	4"	"
1½"	"	"	4½"	"
5"	"	"	5½"	"
6"	"	"	6"	"
6"	"	"	8"	"
7"	"	"	7"	"
8"	"	"	8"	"
9"	"	"	9"	"

HYDE COMBINED STEAM AND HAND STEERER

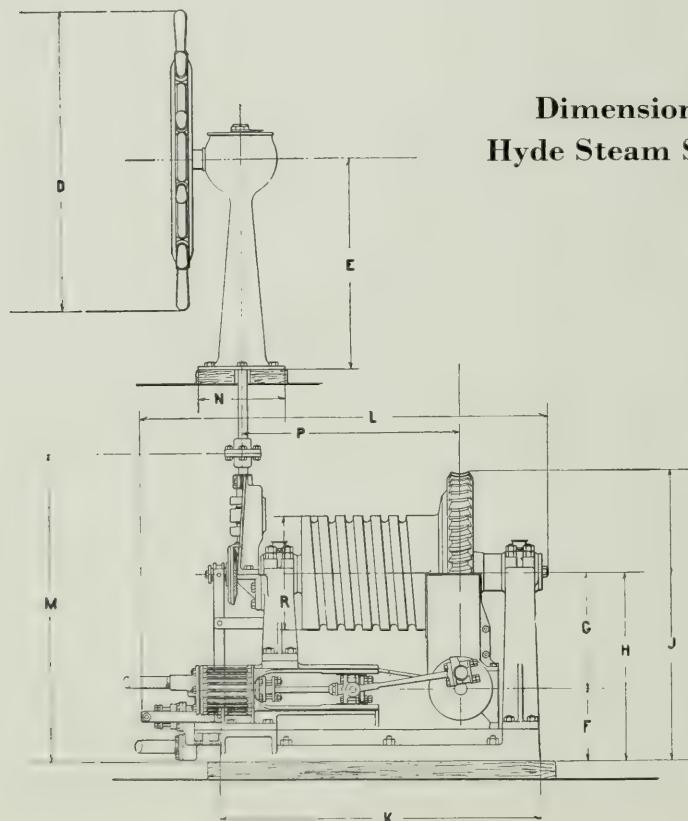


THIS is the same type of engine as shown on opposite page, with the exception that a pinion shaft is added, carrying clutch and pinion, the pinion being in mesh with a spur gear attached to engine drum. By this means a method is furnished for operating the drum of engine by hand through the steam steering wheel that controls the valve of steering engine when steering by steam. The change from one method of steering to the other can be made at the steering engine or from pilot house as preferred. Both these steering engines as well as all the steering engines made by this Company, are fitted with a patent check valve which automatically shuts off steam from the engine whenever the engine is at rest.

These engines are supplied in the same sizes as that on the opposite page.

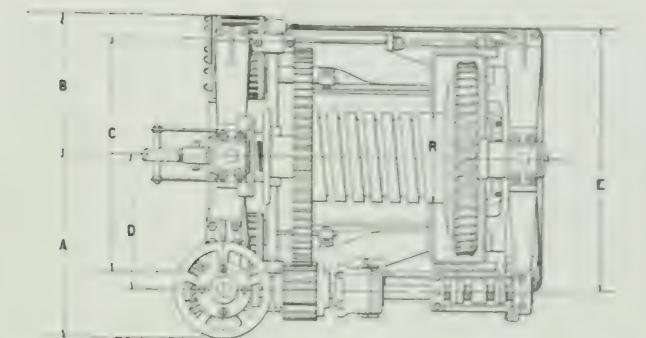


Dimensions of Hyde Steam Steerers

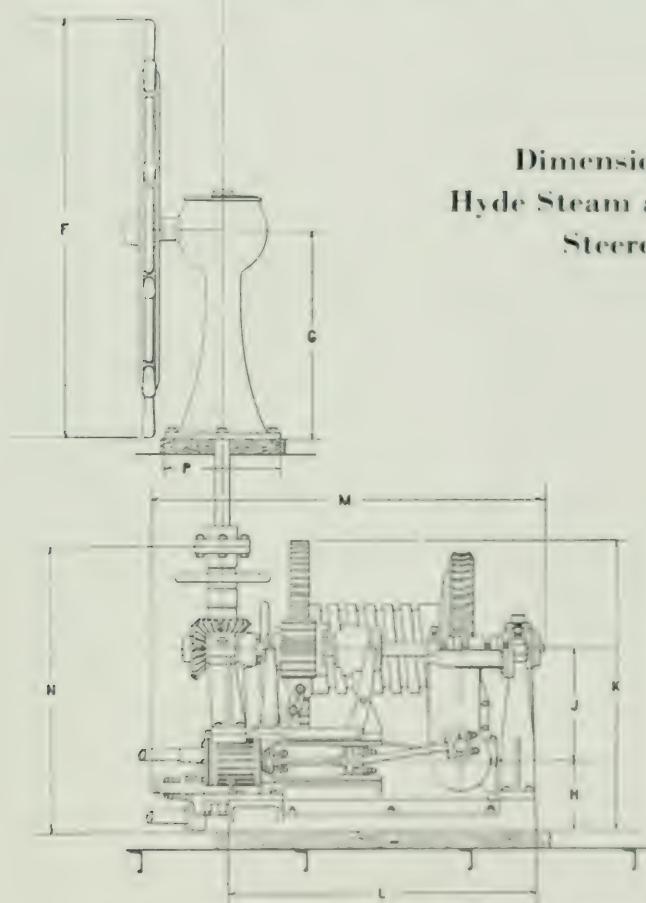


**DIMENSIONS OF STEERING ENGINES
WITH DRUM STEAM ONLY**

SIZ	A	B	C	D	E	F	G	H	J	K	L	M	N	P	STEAM	EXHAUST	R
42	45	15	245	276	42	246	51	10	16	274	280	424	35	12	222	12	12
43	46	15	273	270	106	246	51	10	16	273	280	425	35	12	222	12	12
44	48	15	302	42	242	10	16	246	240	405	50	43	12	303	12	12	
45	49	15	327	42	242	10	16	247	241	405	50	43	12	303	12	12	
46	51	15	357	42	242	10	16	248	241	405	50	43	12	303	12	12	
47	52	15	387	42	242	10	16	249	241	405	50	43	12	303	12	12	
48	54	15	417	42	242	10	16	250	241	405	50	43	12	303	12	12	
49	56	15	447	42	242	10	16	251	241	405	50	43	12	303	12	12	
50	58	15	477	42	242	10	16	252	241	405	50	43	12	303	12	12	
51	60	15	507	42	242	10	16	253	241	405	50	43	12	303	12	12	
52	62	15	537	42	242	10	16	254	241	405	50	43	12	303	12	12	
53	64	15	567	42	242	10	16	255	241	405	50	43	12	303	12	12	
54	66	15	597	42	242	10	16	256	241	405	50	43	12	303	12	12	
55	68	15	627	42	242	10	16	257	241	405	50	43	12	303	12	12	
56	70	15	657	42	242	10	16	258	241	405	50	43	12	303	12	12	
57	72	15	687	42	242	10	16	259	241	405	50	43	12	303	12	12	
58	74	15	717	42	242	10	16	260	241	405	50	43	12	303	12	12	
59	76	15	747	42	242	10	16	261	241	405	50	43	12	303	12	12	
60	78	15	777	42	242	10	16	262	241	405	50	43	12	303	12	12	
61	80	15	807	42	242	10	16	263	241	405	50	43	12	303	12	12	
62	82	15	837	42	242	10	16	264	241	405	50	43	12	303	12	12	
63	84	15	867	42	242	10	16	265	241	405	50	43	12	303	12	12	
64	86	15	897	42	242	10	16	266	241	405	50	43	12	303	12	12	
65	88	15	927	42	242	10	16	267	241	405	50	43	12	303	12	12	
66	90	15	957	42	242	10	16	268	241	405	50	43	12	303	12	12	
67	92	15	987	42	242	10	16	269	241	405	50	43	12	303	12	12	
68	94	15	1017	42	242	10	16	270	241	405	50	43	12	303	12	12	
69	96	15	1047	42	242	10	16	271	241	405	50	43	12	303	12	12	
70	98	15	1077	42	242	10	16	272	241	405	50	43	12	303	12	12	
71	100	15	1107	42	242	10	16	273	241	405	50	43	12	303	12	12	
72	102	15	1137	42	242	10	16	274	241	405	50	43	12	303	12	12	
73	104	15	1167	42	242	10	16	275	241	405	50	43	12	303	12	12	
74	106	15	1197	42	242	10	16	276	241	405	50	43	12	303	12	12	
75	108	15	1227	42	242	10	16	277	241	405	50	43	12	303	12	12	
76	110	15	1257	42	242	10	16	278	241	405	50	43	12	303	12	12	
77	112	15	1287	42	242	10	16	279	241	405	50	43	12	303	12	12	
78	114	15	1317	42	242	10	16	280	241	405	50	43	12	303	12	12	
79	116	15	1347	42	242	10	16	281	241	405	50	43	12	303	12	12	
80	118	15	1377	42	242	10	16	282	241	405	50	43	12	303	12	12	
81	120	15	1407	42	242	10	16	283	241	405	50	43	12	303	12	12	
82	122	15	1437	42	242	10	16	284	241	405	50	43	12	303	12	12	
83	124	15	1467	42	242	10	16	285	241	405	50	43	12	303	12	12	
84	126	15	1497	42	242	10	16	286	241	405	50	43	12	303	12	12	
85	128	15	1527	42	242	10	16	287	241	405	50	43	12	303	12	12	
86	130	15	1557	42	242	10	16	288	241	405	50	43	12	303	12	12	
87	132	15	1587	42	242	10	16	289	241	405	50	43	12	303	12	12	
88	134	15	1617	42	242	10	16	290	241	405	50	43	12	303	12	12	
89	136	15	1647	42	242	10	16	291	241	405	50	43	12	303	12	12	
90	138	15	1677	42	242	10	16	292	241	405	50	43	12	303	12	12	
91	140	15	1707	42	242	10	16	293	241	405	50	43	12	303	12	12	
92	142	15	1737	42	242	10	16	294	241	405	50	43	12	303	12	12	
93	144	15	1767	42	242	10	16	295	241	405	50	43	12	303	12	12	
94	146	15	1797	42	242	10	16	296	241	405	50	43	12	303	12	12	
95	148	15	1827	42	242	10	16	297	241	405	50	43	12	303	12	12	
96	150	15	1857	42	242	10	16	298	241	405	50	43	12	303	12	12	
97	152	15	1887	42	242	10	16	299	241	405	50	43	12	303	12	12	
98	154	15	1917	42	242	10	16	300	241	405	50	43	12	303	12	12	
99	156	15	1947	42	242	10	16	301	241	405	50	43	12	303	12	12	
100	158	15	1977	42	242	10	16	302	241	405	50	43	12	303	12	12	
101	160	15	2007	42	242	10	16	303	241	405	50	43	12	303	12	12	
102	162	15	2037	42	242	10	16	304	241	405	50	43	12	303	12	12	
103	164	15	2067	42	242	10	16	305	241	405	50	43	12	303	12	12	
104	166	15	2097	42	242	10	16	306	241	405	50	43	12	303	12	12	
105	168	15	2127	42	242	10	16	307	241	405	50	43	12	303	12	12	
106	170	15	2157	42	242	10	16	308	241	405	50	43	12	303	12	12	
107	172	15	2187	42	242	10	16	309	241	405	50	43	12	303	12	12	
108	174	15	2217	42	242	10	16	310	241	405	50	43	12	303	12	12	
109	176	15	2247	42	242	10	16	311	241	405	50	43	12	303	12	12	
110	178	15	2277	42	242	10	16	312	241	405	50	43	12	303	12	12	
111	180	15	2307	42	242	10	16	313	241	405	50	43	12	303	12	12	
112	182	15	2337	42	242	10	16	314	241	405	50	43	12	303	12	12	
113	184	15	2367	42	242	10	16	315	241	405	50	43	12	303	12	12	
114	186	15	2397	42	242	10	16	316	241	405	50	43	12	303	12	12	
115	188	15	2427	42	242	10	16	317	241	405	50	43	12	303	12	12	
116	190	15	2457	42	242	10	16	318	241	405	50	43	12	303	12	12	
117	192	15	2487	42	242	10	16	319	241	405	50	43	12	303	12	12	
118	194	15	2517	42	242	10	16	320	241	405	50	43	12	303	12	12	
119	196	15	2547	42	242	10	16	321	241	405	50	43	12	303	12	12	
120	198	15	2577	42	242	10	16	322	241	405	50	43	12	303	12	12	
121	200	15	2607	42	242	10	16	323	241	405	50	43	12	303	12	12	
122	202	15	2637	42	242	10	16	324	241	405	50	43	12	303	12	12	
123	204	15	2667	42	242	10	16	325	241	405	50	43	12	303	12	12	
124	206	15	2697	42	242	10	16	326	241	405	50	43	12	303	12	12	
125	208	15	2727	42	242	10	16	327	241	405	50	43	12	303	12	12	
126	210	15	2757	42	242	10	16	328	241	405	50	43	12	303	12	12	
127	212	15	2787	42	242	10	16	329	241	405	50	43	12	303	12	12	
128	214	15	2817	42	242	10	16	330	241	405	50	43	12	303	12	12	
129	216	15	2847	42	242	10	16	331	241	405	50	43	12	303	12	12	
130	218	15	2877	42	242	10	16	332	241	405	50	43	12	303	12	12	
131	220	15	2907	42	242	10	16	333	241	405	50	43	12	303	12	12	
132	222	15	2937	42	242	10	16	334	241	405	50	43	12	303	12	12	
133	224	15	2967	4													



Dimensions of Hyde Steam and Hand Steerers

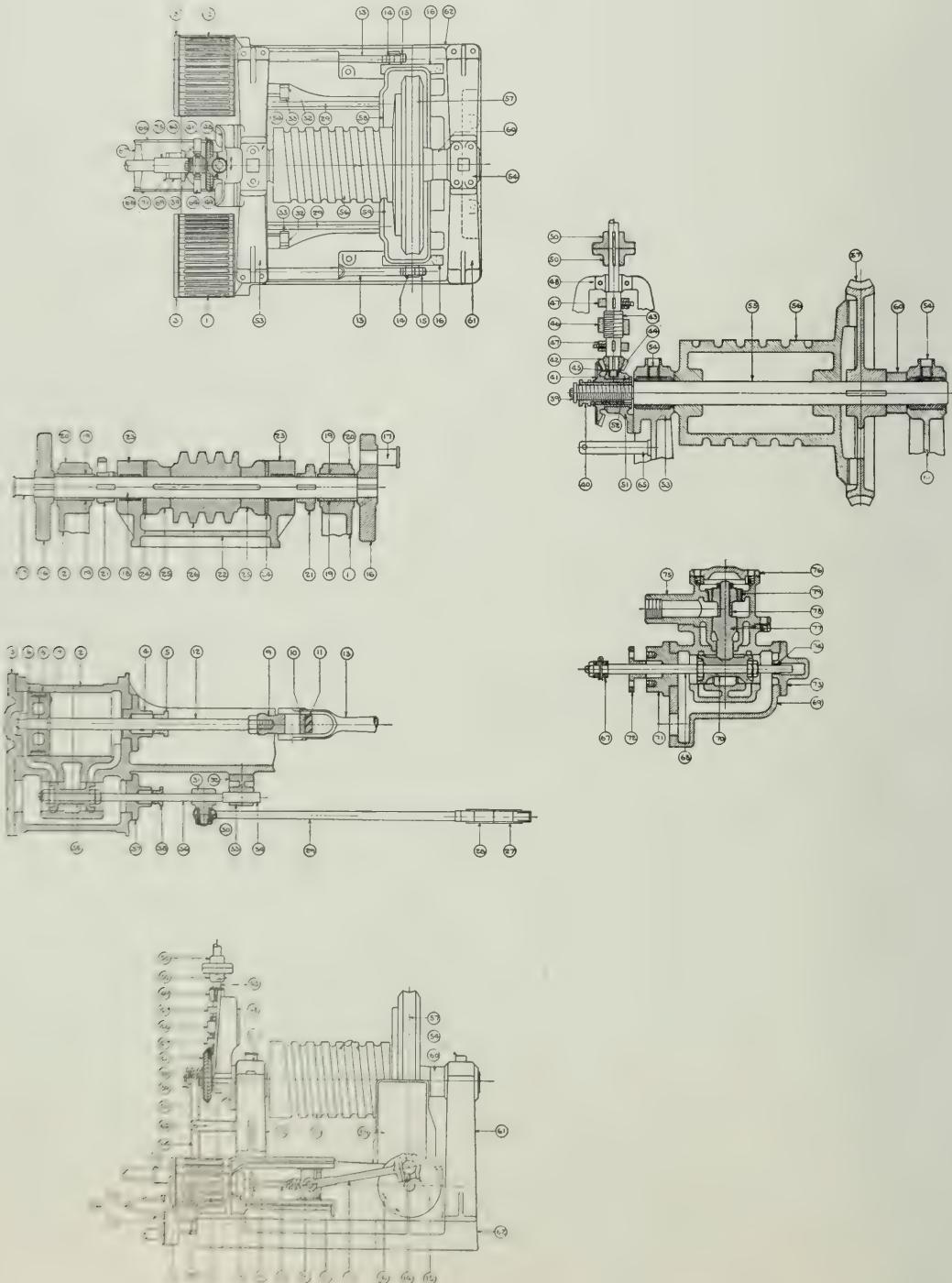


DIMENSIONS OF STEERING ENGINES

WITH DRUM STEAM AND HARD LEADING

SIZE A B C D E F G H J K L M N P STEAMEINHAUS R

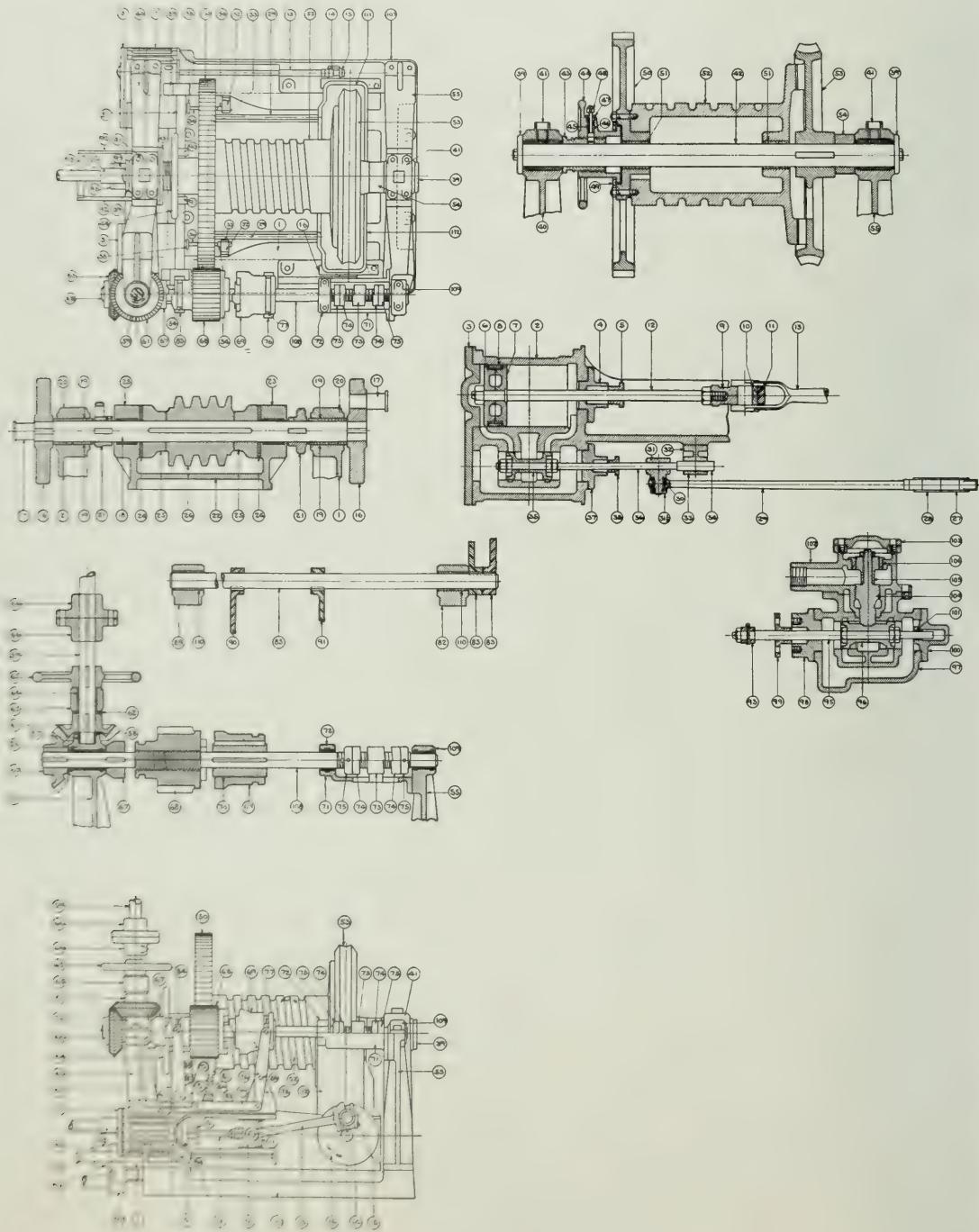
LIST OF PARTS FOR STEAM STEERER



LIST OF PARTS FOR STEAM STEERER

1. Cylinder and Slides.
2. Cylinder and Slides.
3. Cylinder Cover.
4. Piston Rod Stuffing Box.
5. Piston Rod Stuffing Box Gland.
6. Half Piston.
7. Half Piston.
8. Piston Ring.
9. Crosshead.
10. Crosshead Box.
11. Crosshead Binder.
12. Piston Rod.
13. Connecting Rod.
14. Connecting Rod Box.
15. Connecting Rod Box.
16. Crank Disk.
17. Crank Pin.
18. Crank Shaft.
19. Crank Shaft Box.
20. Crank Shaft Cap.
21. Eccentric Sheave.
22. Thrust Bearing.
23. Thrust Bearing Cap.
24. Thrust Collar.
25. Worm Butt.
26. Worm.
27. Eccentric Strap.
28. Eccentric Strap.
29. Eccentric Rod.
30. Eccentric Rod Bushing.
31. Valve Stem Knuckle.
32. Valve Stem Guide.
33. Valve Stem Guide Cap.
34. Valve Stem Block.
35. Piston Valve.
36. Piston Valve Stem.
37. Piston Valve Stem Stuffing Box.
38. Piston Valve Stem Stuffing Box Gland.
39. Drum Shaft Collar.
40. Sleeve.
41. Bevel Gear.
42. Bevel Pinion.
43. Upright Shaft.
44. Upright Shaft Bushing.
45. Thrust Collar.
46. Floating Nut.
47. Floating Nut Stop.
48. Floating Nut Stand.
49. Floating Nut Stand Cap.
50. Flange Coupling.
51. Bevel Gear Bearing.
52. Bevel Gear Bearing Cap.
53. Small Bearing.
54. Drum Shaft Bearing Cap.
55. Drum Shaft.
56. Drum.
57. Engine Worm Gear.
58. Gear Casing.
59. Gear Casing.
60. Distance Collar.
61. Large Bearing.
62. Bed Plate.
63. Sleeve Swivel.
64. Controlling Lever.
65. Lever Bracket.
66. Control Valve Stem Link.
67. Control Valve Stem Yoke.
68. Control Valve Stem.
69. Control Valve Body.
70. Control Valve Piston Valve.
71. Control Valve Piston Valve Stuffing Box.
72. Control Valve Piston Valve Stuffing Box Gland.
73. Control Valve Cover and Guide.
74. Control Valve Stem Bushing.
75. Check Valve Body.
76. Check Valve Body Cover.
77. Lower Check Valve.
78. Upper Check Valve.
79. Upper Check Valve Seat.

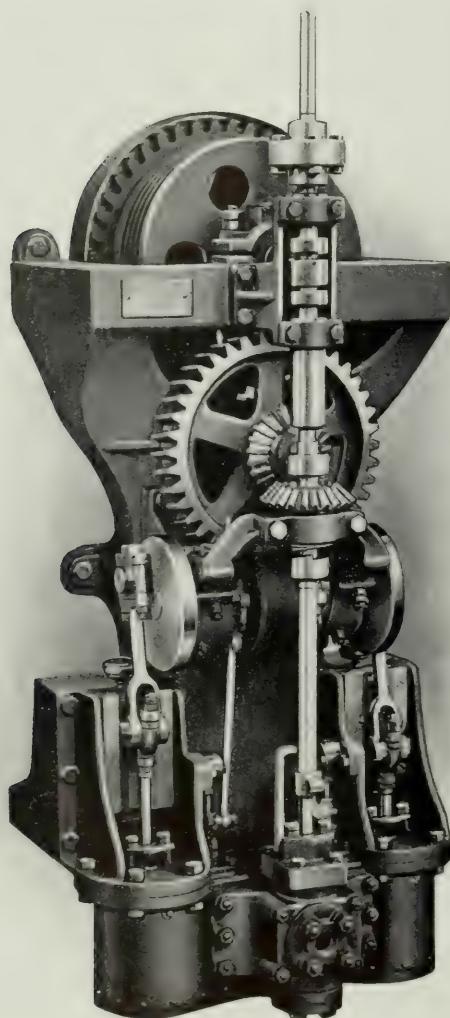
LIST OF PARTS FOR STEAM AND HAND STEERER



LIST OF PARTS FOR STEAM AND HAND STEERER

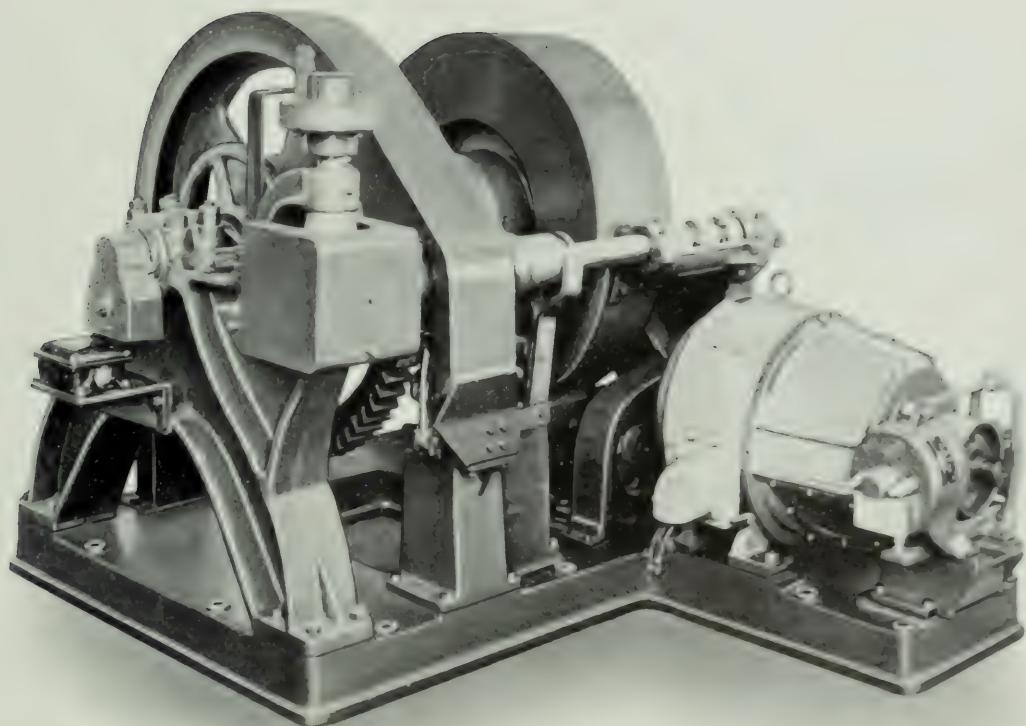
1. Cylinder and Slides.
2. Cylinder and Slides.
3. Cylinder Cover.
4. Piston Rod Stuffing Box.
5. Piston Rod Stuffing Box Gland.
6. Half Piston.
7. Half Piston.
8. Piston Ring.
9. Crosshead.
10. Crosshead Box.
11. Crosshead Binder.
12. Piston Rod.
13. Connecting Rod.
14. Connecting Rod Box.
15. Connecting Rod Box.
16. Crank Disk.
17. Crank Pin.
18. Crank Shaft.
19. Crank Shaft Box.
20. Crank Shaft Cap.
21. Eccentric Sheave.
22. Thrust Bearing.
23. Thrust Bearing Cap.
24. Thrust Collar.
25. Worm Butt.
26. Worm.
27. Eccentric Strap.
28. Eccentric Strap.
29. Eccentric Rod.
30. Eccentric Rod Bushing.
31. Valve Stem Knuckle.
- 31a. Valve Stem Knuckle Collar.
32. Valve Stem Guide.
33. Valve Stem Guide Cap.
34. Valve Stem Block.
35. Piston Valve.
36. Piston Valve Stem.
37. Piston Valve Stem Stuffing Box.
38. Piston Valve Stem Stuffing Box Gland.
39. Drum Shaft Collar.
40. Short Bearing.
41. Drum Shaft Cap.
42. Drum Shaft.
43. Screw Locking Yoke.
44. Locking Hand Wheel.
45. Stop Pin.
46. Stop Pin Spring.
47. Stop Pin Hole Plug.
48. Stop Pin Handle.
49. Half Collar.
50. Spur Gear.
51. Gear and Drum Bushing.
52. Drum.
53. Engine Worm Gear.
54. Drum Shaft Collar.
55. Large Bearing.
56. Countershaft Cap.
57. Upright Shaft Bushing.
58. Upright Shaft Collar.
59. Upright Shaft.
60. Mitre Gear.
61. Mitre Gear.
62. Collar.
63. Spring Bearing.
64. Spring Bearing Bushing.
65. Handwheel.
66. Flange Coupling.
67. Collar with Stop.
68. Spur Pinion.
69. Clutch.
70. Clutch Sleeve.
71. Floating Nut Guide.
72. Floating Nut Guide Cap.
73. Floating Nut.
74. Floating Nut Stop.
75. Adjusting Collar.
76. Clutch Lever.
77. Clutch Swivel.
78. Clutch Lever Bearing.
79. Side Link.
80. Shifting Lever.
81. Shipper.
82. Control Shaft Bearing.
83. Swivel Lever.
84. Pinion Swivel.
85. Control Shaft.
86. Clutch Lever Bolt.
87. Shifting Lever Bolt.
88. Shipper Spindle.
89. Control Shaft Bearing.
90. Control Valve Stem Lever.
91. Control Valve Stem Lever.
92. Control Valve Stem Link.
93. Control Valve Stem Yoke.
94. Lever Bolt.
95. Control Valve Stem.
96. Control Piston Valve.
97. Control Valve Body.
98. Control Valve Stuffing Box.
99. Control Valve Stuffing Box Gland.
100. Control Valve Cover and Gland.
101. Control Valve Stem Bushing.
102. Check Valve Body.
103. Check Valve Body Cover.
104. Lower Check Valve.
105. Upper Check Valve.
106. Upper Check Valve Seat.
107. Bed Plate.
108. Countershaft.
109. Countershaft Cap.
110. Control Shaft Bushing.
111. Half Gear Casing.
112. Half Gear Casing.

HYDE STEAM STEERING ENGINE



THE engine shown in cut is designed for bolting to a vertical bulkhead in the main engine room; the drum being on top makes a very convenient lead of the wire ropes to each side for connecting to quadrant ropes or chains. This engine was designed partly for installing on steam yachts where it is desirable for all the machinery to be located in one compartment if possible. The vertical shaft on the engine extends to the steering stand located in the pilot house.

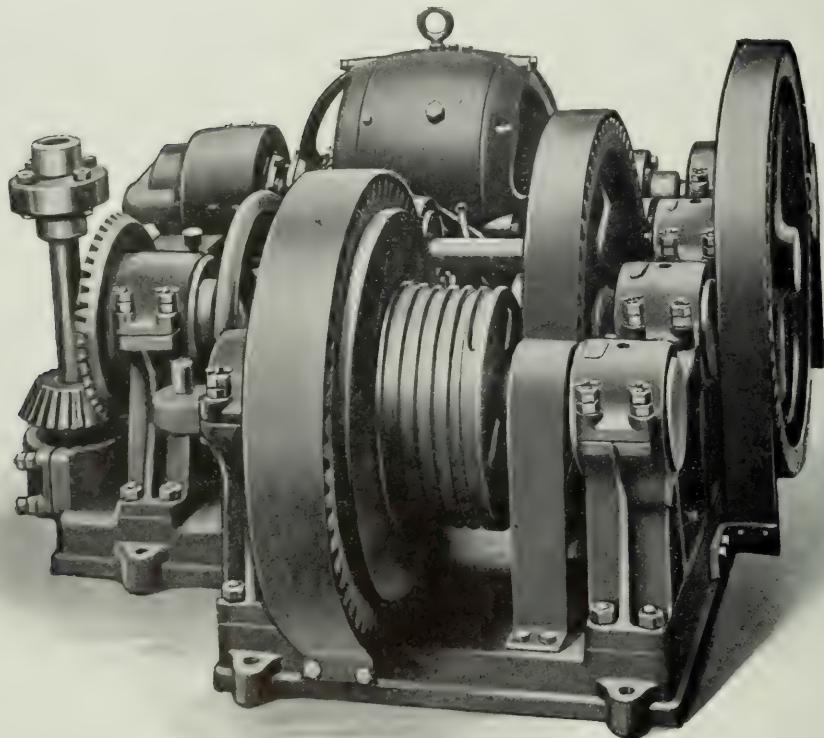
HYDE ELECTRIC DRUM STEERER With Hand Steering



THE electric steerer as illustrated is a combined electrically driven and hand operated steerer. Marine motor and brake are water-tight or drip-proof. Electric non-follow-up control is recommended. The steerer is generally located aft and fitted with drum grooved for chain or wire rope which connects to the quadrant on the rudder stock. The hand wheel at the end of the drum shaft provides a quick means for disconnecting the drum from the worm gear when hand steering is to be used. Steering gear of this type can be furnished in any size to meet requirements.

HYDE ELECTRIC DRUM STEERER

Spur Geared Type



THIS steerer was designed to meet the requirements of a light and efficient steering gear and at the same time is capable of exerting a powerful pull on the quadrant, wire ropes or chains. Marine motor and brake are water-tight or drip-proof. Electric non-follow-up control is recommended. This type of steering gear can be furnished in any size, whether electric or combined electric and hand steerer.

**HYDE
STEAM AND ELECTRIC
CAPSTANS AND GYPSYS**



HYDE WINDLASS COMPANY

Bath, Maine

No. 28

THE "HYDE" POWER CAPSTAN

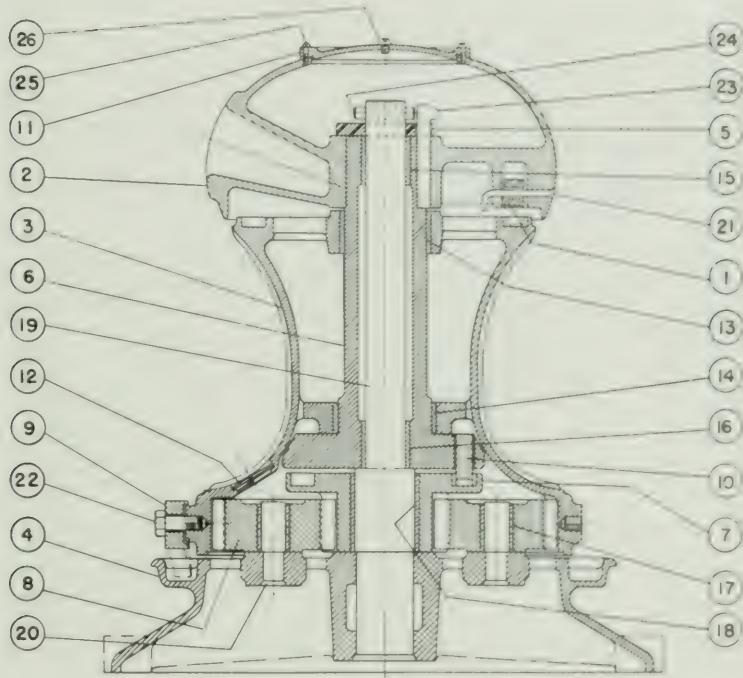


THESE capstans are in very general use and challenge comparison with any made. The gears are in the lower part of barrel where there is room to make them of ample strength. The strain is taken by the inside pawls as well as by those on the outside, and as the inside pawls are sufficiently strong to hold the load even if the outer ones were left off entirely, the danger as well as the annoyance of "jumping" is avoided. It is only necessary to turn the head in the opposite direction for power after the slack is all taken in, the barrel always turning in the same direction.

All bearings are of composition, and all parts are interchangeable and can be duplicated at any time.

No.	Diameter Barrel Inches	Diameter Base Inches	Height Inches	Weight Pounds
1	15	36	44	1600
2	13	34	42	1300
3	11	32	40	1050
4	10	30	34½	725
5	9	29	32	560
6	8½	26	29	475
7	8¼	24	27	375

LIST OF PARTS FOR POWER CAPSTAN



NO. OF PART	NAME OF PART	NO. OF PART	NAME OF PART
1	HEAD PAWL	14	BUSHING (LOWER BODY)
2	HEAD	15	BUSHING (SLEEVE UPPER)
3	BODY	16	BUSHING (SLEEVE LOWER)
4	BASE	17	BUSHING (PINION)
5	COLLAR	18	BUSHING (CENTER GEAR)
6	SLEEVE	19	CAPSTAN SHAFT
7	CENTER GEAR	20	PINION PINS
8	PINION	21	HEAD PAWL PIN
9	BODY PAWL	22	BODY PAWL BOLT
10	DROP PAWL	23	SPECIAL KEY
11	COVER	24	SHAFT PIN
12	SPECIAL PLUG (FOR OILING PINIONS)	25	ROUND HEAD COVER SCREW
13	BUSHING (UPPER BODY)	26	ROUND HEAD SCREW FOR OILING PURPOSES

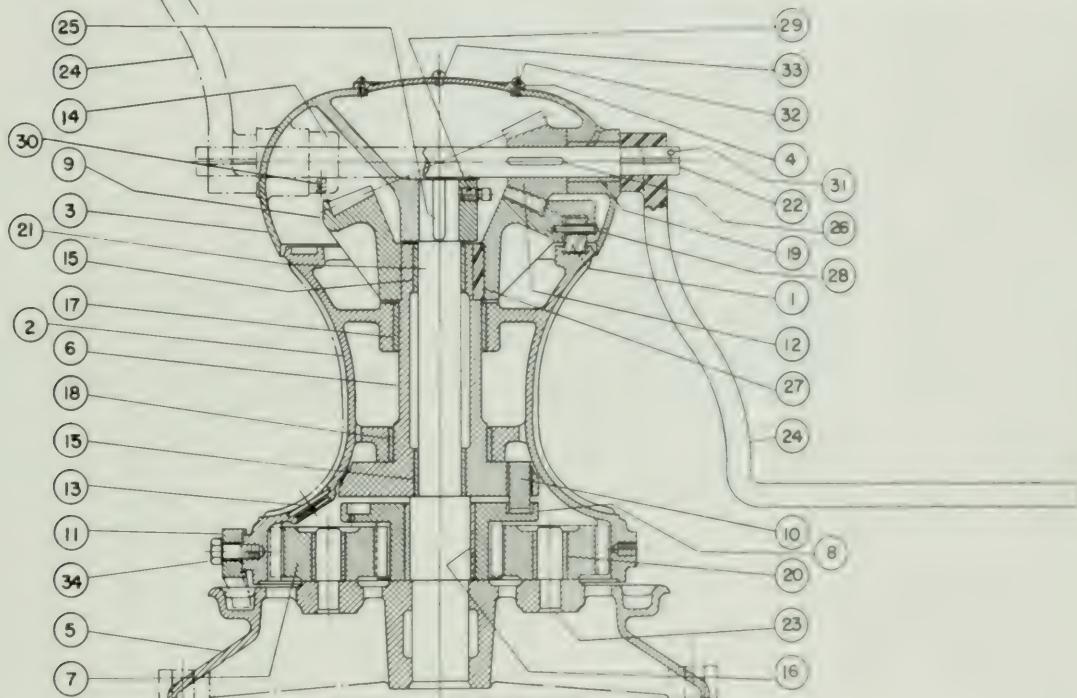
THE "HYDE" CRANK CAPSTAN



THE capstan here shown is especially useful where the deck room is limited and not space enough to work the ordinary power capstan, and like that capstan can be driven either for speed or power without change of parts, etc., it being only necessary to turn the cranks in one direction for speed and in the opposite direction for power, the barrel always turning in the same direction. When not in use the cranks can be taken off and stowed away, thus leaving the space clear around the capstan as in the case of the power capstan when not in use.

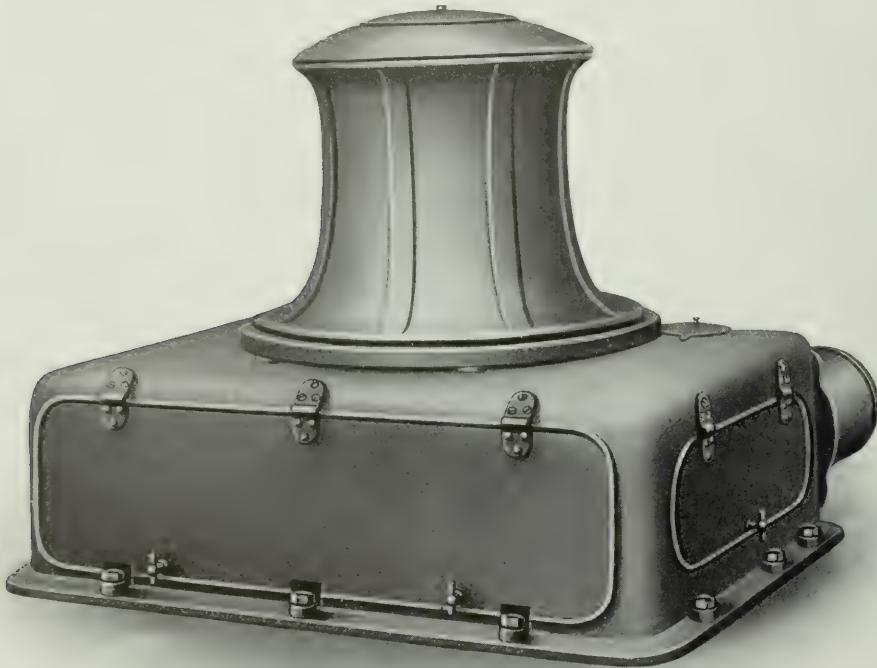
No.	Diameter Barrel Inches	Diameter Base Inches	Height Inches	Weight Pounds
1	15			
2	13	39	44	1600
3	11	33	41	1200
4	10	29	39	938
5	9	29	35	750
6	8 $\frac{1}{2}$	26	30	570
7	8 $\frac{1}{4}$	24	28	500

LIST OF PARTS FOR CRANK CAPSTAN



NO. OF PART	NAME OF PART	NO. OF PART	NAME OF PART
1	HEAD PAWL	18	BUSHING (LOWER BODY)
2	CAPSTAN BODY	19	BUSHING (HEAD CRANK SHAFT)
3	CAPSTAN HEAD	20	BUSHING (PINION)
4	CAPSTAN HEAD COVER	21	CAPSTAN SHAFT
5	CAPSTAN BASE	22	CRANK SHAFT
6	SLEEVE	23	PINION PIN
7	PINION (SPUR)	24	CRANK
8	CENTER GEAR	25	KEY (HEAD)
9	BEVEL GEAR	26	KEY (BEVEL PINION)
10	SLEEVE DROP PAWL	27	KEY (BEVEL GEAR)
11	BODY PAWL	28	HEAD PAWL PIN
12	BEVEL PINION	29	SET SCREW (HEAD)
13	SPECIAL PLUG (FOR OILING PURPOSES)	30	SET SCREW (CRANK SHAFT COLLAR)
14	CRANK SHAFT COLLAR	31	CRANK SHAFT PIN
15	BUSHING (SLEEVE)	32	ROUND HEAD COVER SCREW
16	BUSHING (CENTER GEAR)	33	ROUND HEAD SCREW (FOR OILING PURPOSES)
17	BUSHING (UPPER BODY)	34	BODY PAWL BOLT

THE "HYDE" STEAM GYPSY



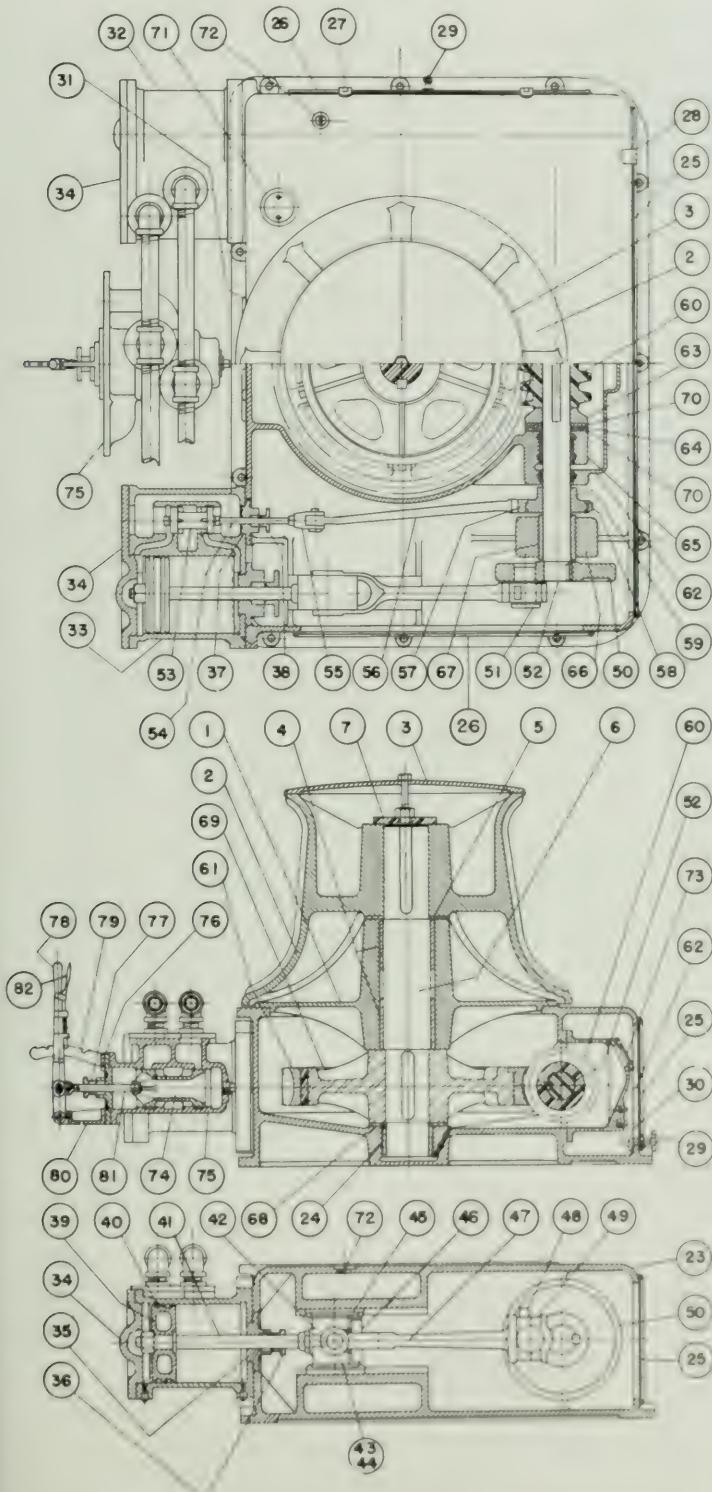
ENGINES ENCLOSED IN BASE

THIS steam gypsy is a favorite type for locating on vessels where the space under deck cannot be used for installing a steam engine. In this type the engine is entirely enclosed in the base under the gypsy. It is installed on many large steamships, and to a great extent on tugboats where used for general warping purposes. We furnish this steam gypsy of the same size engines as are used on the steam capstan, as follows:

DIMENSIONS OF STEAM GYPSYS (DOCK TYPE)

Diam. Gypsy	Engine	Height	Width Eng. Bed	Length Eng. Bed	Length Overall	Weight	Size Rope
15"	4 ¹ / ₂ " x 6"	2' 10"	4'-3"	3'-4"	4'-2"	2900	5"
15"	6" x 6"	2'-10"	4' 3"	3'-4"	4'-2"	3200	5"
20"	5" x 8"	3' 1"	4'-5"	3'-6"	4'-7"	4000	6"
20"	6" x 8"	3'-1"	4' 5"	3'-6"	4'-7"	4250	6"
22"	7" x 8"	3' 8"	4'-12"	3'-11"	6'-1"	5200	7"
22"	8" x 8"	3' 8"	4'-12"	3'-11"	6'-1"	5600	7"
24"	9" x 9"	4' 9"	5'-5"	4'-5"	5'-6"	7000	8"
24"	10" x 10"	4'-10"	6'-1"	4'-6"	6'-10"	9000	8"

LIST OF PARTS FOR STEAM DOCK GYPSY OR CAPSTAN



NO OF PART	NAME OF PART
1	GYPSY BASE
2	GYPSY HEAD
3	GYPSY HEAD COOLER
4	GYPSY BASE BUSHING
5	GYPSY THRUST COLLAR
6	GYPSY SHAFT
7	GYPSY SHAFT CAP
23	ENGINE PAN
24	ENGINE PAN BUSHING
25	LARGE DOOR
26	SMALL DOOR
27	FLAT HINGE
28	CURVED HINGE
29	DOOR HANDLE
30	DOOR CATCH
31	HANDHOLE COVER
32	CYLINDER (RIGHT)
33	CYLINDER (LEFT)
34	CYLINDER COVER
35	PISTON ROD STUFFING BOX
36	PISTON ROD STUFFING BOX GLAND
37	VALVE STEM STUFFING BOX
38	VALVE STEM STUFFING BOX GLAND
39	PISTON
40	PISTON RING
41	PISTON ROD
42	CROSSHEAD
43	CROSSHEAD HALF BOX
44	CROSSHEAD HALF BOX
45	CROSSHEAD GIBBS
46	CROSSHEAD BINDER
47	CONNECTING ROD
48	CONNECTING ROD BOX WITH OIL BOX
49	CONNECTING ROD BOX WITHOUT OIL BOX
50	CRANK DISK
51	CRANK PIN
52	CRANK SHAFT
53	PISTON VALVE
54	VALVE STEM
55	VALVE STEM KNUCKLE
56	ECCENTRIC ROD
57	ECCENTRIC STRAP (INNER)
58	ECCENTRIC STRAP (OUTER)
59	ECCENTRIC SHEAVE
60	WORM
61	WORM GEAR RIM
62	WORM CASING
63	WORM BUTT
64	THRUST COLLAR (CAST IRON)
65	THRUST BEARING CAP
66	CRANK SHAFT BEARING CAP
67	CRANK SHAFT BEARING BOX (HALF)
68	WORM GEAR THRUST COLLAR
69	WORM GEAR CENTER
70	THRUST COLLAR (COMPOSITION)
71	SPECIAL PLUG
72	SPECIAL PLUG
73	HANDHOLE COVER
74	REVERSE VALVE
75	REVERSE VALVE BODY
76	REVERSE VALVE COVER AND STUFFING BOX
77	REVERSE VALVE STUFFING BOX GLAND
78	REVERSE VALVE LEVER
79	REVERSE VALVE QUADRANT
80	REVERSE VALVE LEVER BRACKET
81	REVERSE VALVE STEM
82	REVERSE VALVE LEVER LATCH

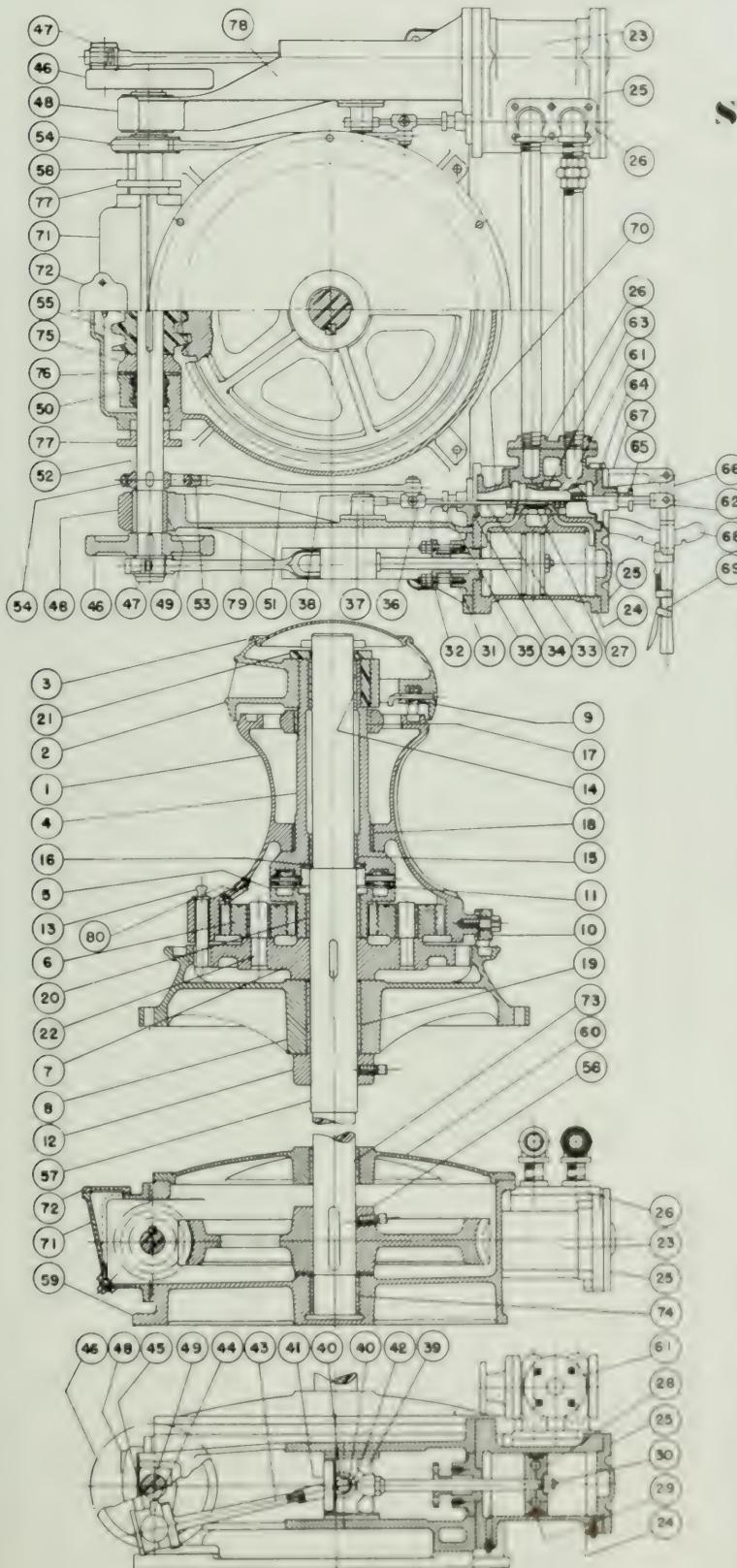
— NOTE —
 THIS MACHINE IS FURNISHED
 WITH GYPSY HEAD OR CAPSTAN
 HEAD — THE ABOVE LIST IS
 COMPLETE FOR DOCK GYPSY.
 IF CAPSTAN HEAD IS
 FURNISHED SEE PAGE NO. 9.
 FOR PART NUMBERS 1 TO 22
 INCLUSIVE, ALL OTHER PARTS
 ARE COMMON TO BOTH.

THE "HYDE" STEAM CAPSTAN



DIMENSIONS OF STEAM CAPSTANS

Size	Engine	Diam. Barrel	Diam. Base	Height	Length	Width	Weight
5	4 ¹ / ₂ " x 6"	9"	29"	32"	3'-5"	3'-10"	3200
5	6" x 6"	9"	29"	32"	3'-5"	4'-3"	3425
4	5" x 8"	10"	30"	34 ¹ / ₂ "	4'-2"	5'-2"	4100
3	6" x 8"	11"	32"	40"	4'-2"	5'-2"	4300
3	7" x 8"	11"	32"	40"	4'-10"	5'-11"	5350
2	8" x 8"	13"	34"	42"	4'-10"	5'-11"	5700



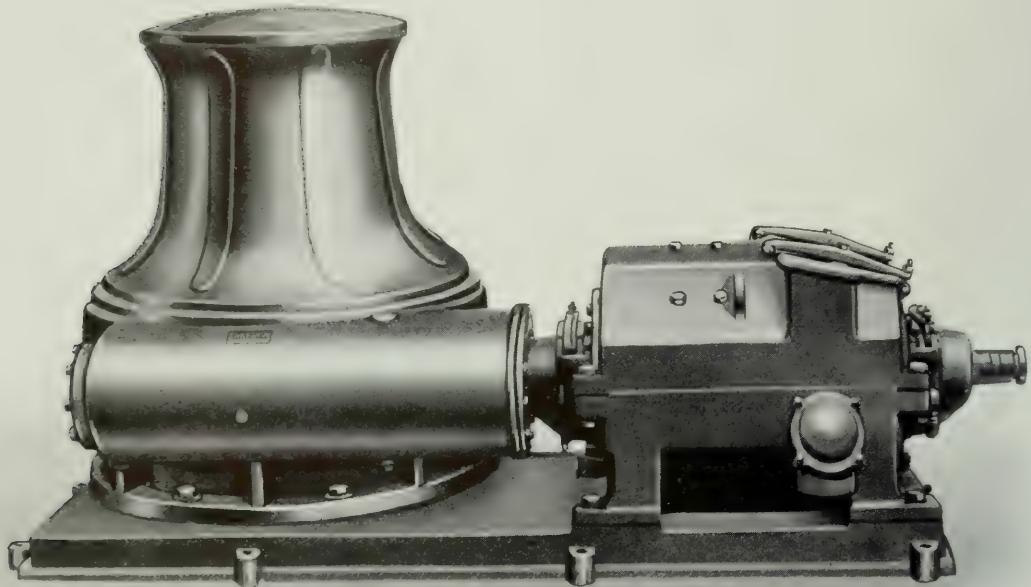
LIST OF PARTS FOR STEAM CAPSTAN OR GYPSY

NO OF PART	NAME OF PART
1	CAPSTAN BODY
2	CAPSTAN HEAD
3	CAPSTAN COVER
4	CAPSTAN SLEEVE
5	CAPSTAN CENTER GEAR
6	CAPSTAN PINION CARRIER
7	CAPSTAN BASE
8	CAPSTAN HEAD PAWL
9	CAPSTAN OUTSIDE BODY PAWL
10	CAPSTAN SLEEVE PAWL
11	CAPSTAN COLLAR
12	CAPSTAN LOCATING PIN
13	SLEEVE BUSHING TOP
14	SLEEVE BUSHING BOTTOM
15	CAPSTAN SLEEVE TOP COLLAR
16	CAPSTAN BODY BUSHING TOP
17	CAPSTAN BODY BUSHING BOTTOM
18	CAPSTAN BASE BUSHING
20	CAPSTAN CENTER GEAR BUSHING
21	CAPSTAN SHAFT TOP COLLAR
22	CAPSTAN PINION PIN
23	CYLINDER (RIGHT)
24	CYLINDER (LEFT)
25	CYLINDER COVER
26	PIPE FLANGE
27	PISTON VALVE
28	PISTON (HALF)
29	PISTON RING
30	PISTON ROD
31	PISTON ROD STUFFING BOX
32	PISTON ROD STUFFING BOX GLAND
33	VALVE STEM
34	VALVE STEM STUFFING BOX
35	VALVE STEM STUFFING BOX GLAND
36	VALVE STEM KNUCKLE
37	VALVE STEM GUIDE
38	VALVE STEM GUIDE CAP
39	CROSSHEAD
40	CROSSHEAD BOX
41	CROSSHEAD PIN
42	CROSSHEAD PIN
43	CONNECTING ROD
44	CONNECTING ROD BOX (WITH OIL CUP)
45	CONNECTING ROD BOX (WITHOUT OIL CUP)
46	CRANK DISK
47	CRANK PIN
48	CRANK SHAFT BEARING CAP
49	CRANK SHAFT BEARING BOXES
50	THRUST BEARING CAP
51	ECCENTRIC ROD
52	ECCENTRIC SCREW
53	ECCENTRIC STRAP (INNER)
54	ECCENTRIC STRAP (OUTER)
55	ENGINE WORM
56	ENGINE WORM GEAR
57	MAIN SHAFT
58	CRANK SHAFT
59	WORM GEAR CASING
60	WORM GEAR CASING COVER
61	REVERSE VALVE
62	REVERSE VALVE STEM
63	REVERSE VALVE PISTON VALVE
64	REVERSE VALVE HEAD AND STUFFING BOX
65	REVERSE VALVE STUFFING BOX GLAND
66	REVERSE VALVE LEVER
67	REVERSE VALVE LEVER BRACKET
68	REVERSE VALVE LEVER QUADRANT
69	REVERSE VALVE LEVER LEAF
70	REVERSE VALVE READING FITTING
71	WORM CASING
72	WORM CASING INSPECTION HOLE COVER
73	WORM GEAR CASING COVER INSIDE
74	WORM GEAR CASING BUSHING
75	WORM BUSH
76	WORM THRUST COLLAR
77	WORM CASING PACKING GLAND
78	ENGINE FRAME (RIGHT)
79	ENGINE FRAME (LEFT)
80	SPECIAL PLATE (FOR DRILLING PURPOSES)

— NOTE —
THIS MACHINE IS FURNISHED
WITH CAPSTAN HEAD OR
GYPSY HEAD - THE ABOVE
LIST IS COMPLETE FOR THE
CAPSTAN.

IF GYPSY HEAD IS
FURNISHED SEE PART NOS. 1
TO 7 INCLUSIVE ON PAGE 7.
ALL PART NO'S. FROM 23 TO
79 INCLUSIVE ARE COMMON
TO BOTH.

THE "HYDE" ELECTRIC GYPSY

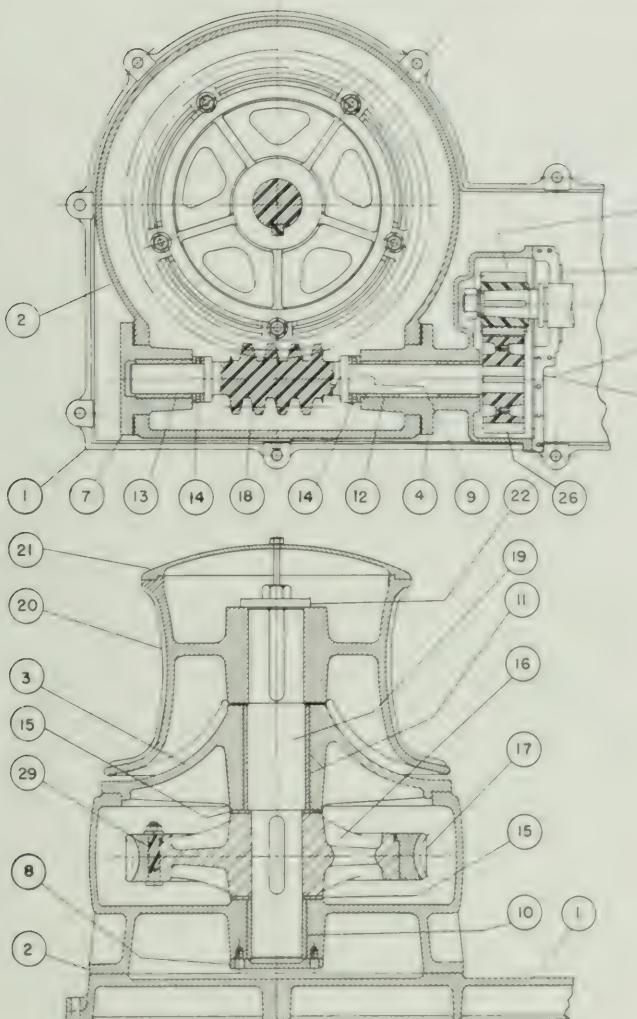


DIMENSIONS OF ELECTRIC GYPSYS

Horse Power	Diam. Gypsy	Length	Width	Height	CAPACITY Pounds	Speed	Weight with Motor	Size Rope	Breaking Strength Rope
7 1/2	11"	4'-6"	25"	2'-2 1/2"	3000	40'	1725	4"	15000
10	13 1/2"	4'-6"	25"	2'-6"	4100	40'	1900	4 1/2"	18500
15	15"	5'-8"	2'-9"	3'-0"	6000	40'	1950	5"	22500
20	15"	5'-8"	2'-9"	3'-0"	8200	40'	2400	5"	22500
25	18"	7'-1"	3'-3"	3'-5"	10000	40'	4755	6"	31000
35	20"	7'-2"	3'-9 1/4"	3'-8"	15000	40'	5600	7"	41000
50	22"	8'-8"	4'-0"	4'-6"	22000	40'	8420	7"	41000
75	24"	9'-6"	4'-8"	4'-6"	31250	40'	13600	8"	52000

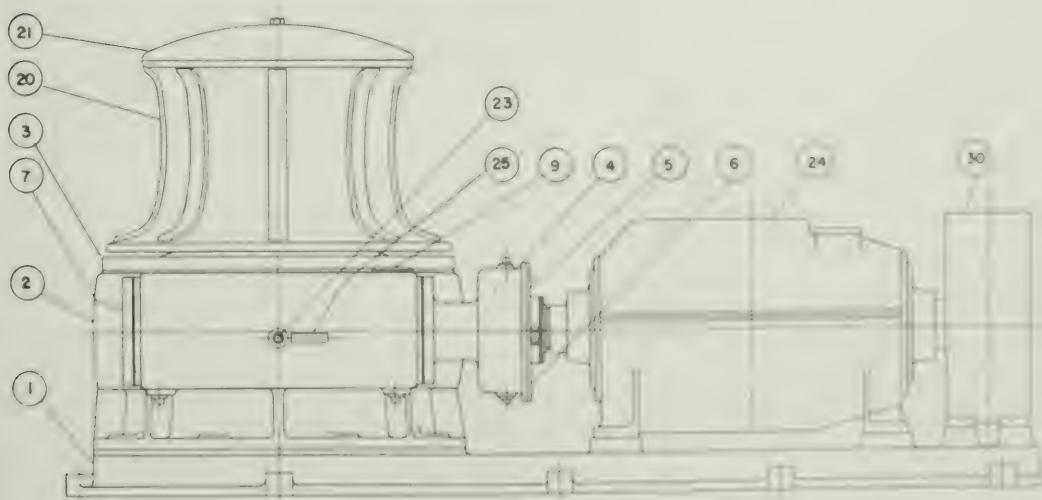
These Electric Gypsys can be furnished with more pull capacity on the Gypsy and a reduction in speed for taking in rope. Motor can be furnished with or without magnetic brake as may be required.

PARTS LIST FOR ELECTRIC GYPSY



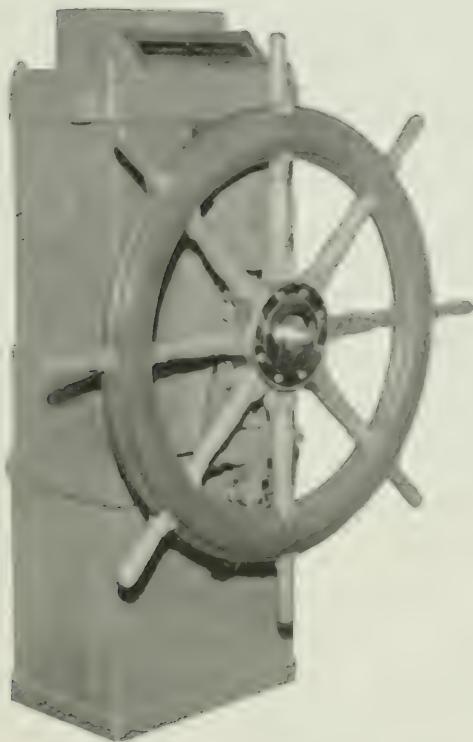
NO OF PART	NAME OF PART
1	BED PLATE
2	WORM GEAR CASING
3	GYPSY BASE
4	SPUR GEAR CASING
5	SPUR GEAR CASING COVER (TOP)
6	SPUR GEAR CASING COVER (BOTTOM)
7	WORM SHAFT BEARING
8	SHAFT COVER
9	OIL HOLE COVER
10	WORM GEAR CASING BUSHING
11	GYPSY BASE PUSH PIN
12	WORM CASING BUSHING
13	WORM SHAFT BEARING BUSHING
14	WORM SHAFT THRUST BEARINGS
15	GYPSY SHAFT THRUST COLLAR
16	WORM GEAR CENTER
17	WORM GEAR RIM
18	WORM SHAFT
19	GYPSY SHAFT
20	GYPSY HEAD
21	GYPSY HEAD COVER
22	GYPSY SHAFT CAP
23	SPECIAL PLUG
24	ELECTRIC MOTOR
25	OIL LEVEL PLATE
26	SPUR GEAR
27	SPUR PINION
28	FELT RETAINER
29	WORM GEAR RIM & CENTER KEYS
30	ELECTRIC BRAKE

—NOTE—
THIS MACHINE IS FURNISHED
WITH OR WITHOUT BRAKE



HYDE

HYDRAULIC TELE MOTOR



HYDE WINDLASS COMPANY
BATH, MAINE

No. 29

HYDE HYDRAULIC TELE MOTOR

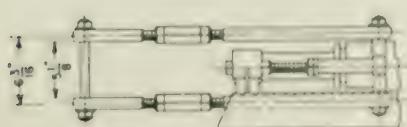
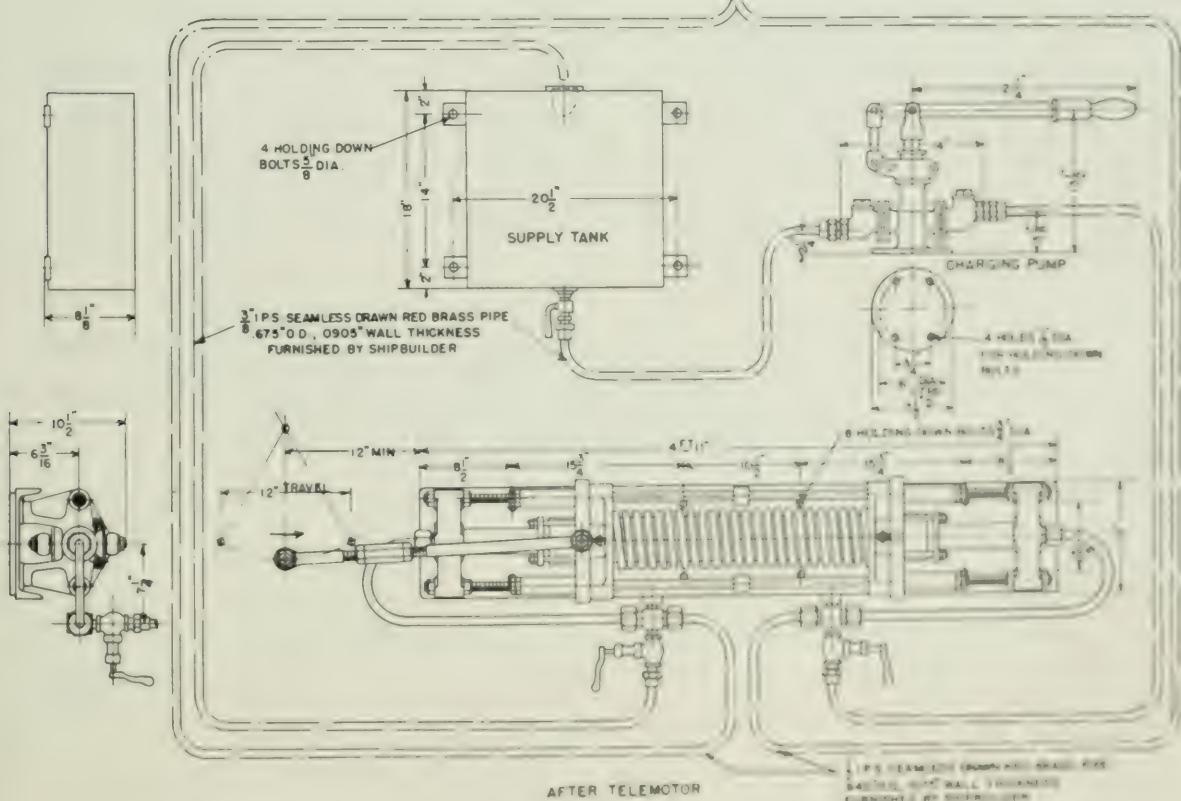
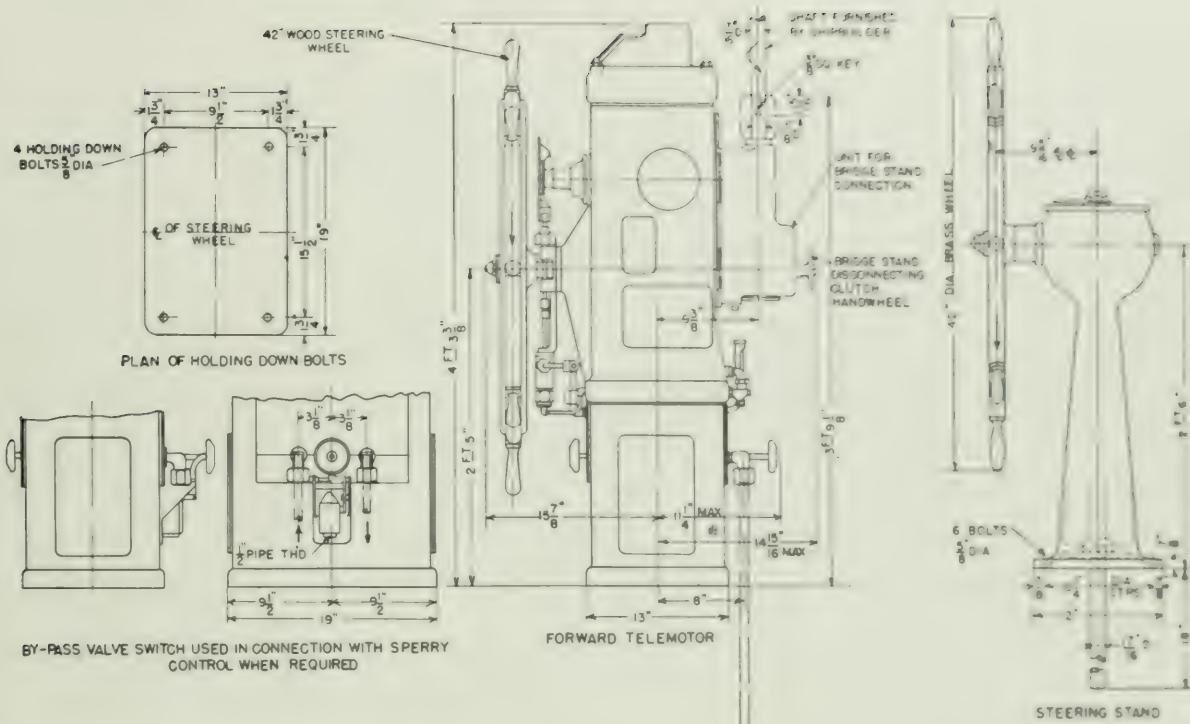
THE Hyde Hydraulic Telemotor is a means of controlling the steering gear, which is located near the stern of the vessel, by a helm in the pilot house. The Telemotor consists of a Forward Telemotor in the pilot house connected by tubing to the After Telemotor in the steering gear compartment.

The Forward Telemotor consists of a double plunger pump operated by the steering wheel. The pump cylinders are located side by side in the lower part of the telemotor in a vertical position. In each cylinder there is a plunger with a toothed rack attached to the upper end. The racks are in mesh with a pinion which is rotated through spur gearing by the steering wheel.

The Forward Telemotor casing is in three sections securely bolted together. The lower section is the support for the upper sections and has space for the plunger cylinders and miscellaneous valves and piping. The middle section supports the cylinders, gearing and shafts, and also acts as an oil expansion and replenishing reservoir. An oil level sight gage is provided to indicate the oil level in the tank. The upper section acts as a top cover and contains the helm angle indicator.

An automatic bypass valve is mounted on the Forward Telemotor which allows the oil pressure in the entire system to be equalized each time the steering wheel is placed in or passes through the amidships position. When the steering wheel is amidships, a cam depresses the stem of the automatic bypass valve, opening the valve. When the valve is open the two cylinders in the Forward Telemotor are cross connected, allowing an equalization of pressure to take place.

In addition to the automatic bypass valve a hand operated bypass valve is also provided. When this valve is open the two cylinders in the Forward



NOTE: ALL HOLDING DOWN BOLTS ARE TO BE SHOWN IN FIG.

Telemotor are cross connected. With the bypass valve open the After Telemotor cylinders may be moved without a corresponding movement of the Forward Telemotor.

On ships which have an electric steering control in addition to the Hydraulic Telemotor for steering control, an interlock switch is mounted so that it is operated by the manual bypass valve hand wheel. In order for power to be available to the electric steering control, this interlock switch must be closed. When this arrangement is used, the valve must be opened in order to close the interlock switch. In this manner the Hydraulic Telemotor will be in a bypass condition when electric power is available to the electric steering control.

Two replenishing and relief valves are also mounted in the Forward Telemotor, one connected to each cylinder. The relief valve provides protection for the system when high pressure results from any abnormal condition, such as excessive effort on the steering wheel. The replenishing valve is connected to the oil in the replenishing reservoir. When pressure in one side of the system falls below atmospheric pressure, its replenishing valve opens, admitting replenishing oil.

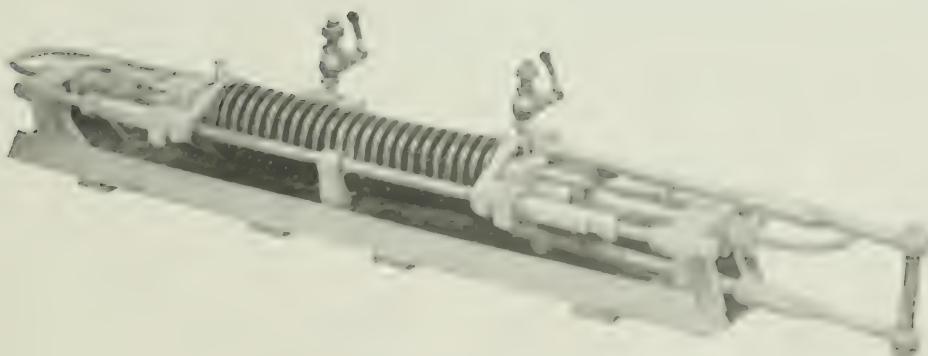
If a bridge steering stand for operating the Forward Telemotor from the deck above the Pilot House is required, a mitre gear connection is provided on the Forward Telemotor to which a vertical shaft from the bridge steering stand may be coupled. A hand clutch is provided for engaging the mitre gear connection.

The After Telemotor consists of a double ended cylinder with a plunger in each end of the cylinder. The plungers are fixed and the double ended cylinder is free to move on the plungers. A spring tends to hold the cylinder in a central position or to return the cylinder to a central position after the cylinder has been moved in either direction. A link attached to the double cylinder transmits movement of the cylinder to the steering gear.

The connecting tubing consists of two lines, each connecting one cylinder in the Forward Telemotor to one end of the double cylinder in the After Telemotor. When the steering wheel on the Forward Telemotor is rotated, the rack pinion rotates, forcing one pump plunger downward and the other plunger upward. In the cylinder in which the plunger is forced downward, pressure is set up in the oil. The pressure is transmitted by one line of the connecting tubing to one end of the double cylinder in the After Telemotor, causing a movement of the double cylinder.

The After Telemotor may be assembled to either hand to suit a particular steering gear arrangement.

A hand operated charging pump and a supply tank are provided for mounting near the After Telemotor.



AFTER TELE MOTOR

OPERATION

Instructions for charging and venting the system are found on Page 7. When the system has been properly vented and all valves are closed, the Telemotor should be ready for operation.

Rotating the steering wheel in either direction from amidships position moves the After Telemotor correspondingly. The hardover position on either side of the Forward Telemotor helm indicator moves the After Telemotor the full distance, or six inches from the central position. If the Telemotor is in proper adjustment, the steering gear will move the rudder to the desired hard-over position.

Frequent checking to see that the After Telemotor responds to various settings of the Forward Telemotor is advisable, especially after newly charging the system. A check can best be made in the hardover position. If the venting procedure does not remedy the condition, the system must be examined for leaks which would allow a loss of pressure. Leaks are also means of allowing air into the system, therefore, after leaks are found and eliminated, the system may require further venting to expel air introduced through former leaks.

To sum up, when testing indicates trouble, take these steps until the system operates properly:

- (1) Vent thoroughly as described on Page 7.
- (2) Eliminate leaks.
- (3) Vent thoroughly.

Covers (Q) give access to relief valves (P) and the plunger stuffing box glands. The plunger glands should be tightened only enough to prevent leak-

CHARGING AND VENTING

1. FILL TANK B THROUGH STRAINER C WITH 'TELEMOTOR OIL'.
 2. OPEN COCK G, VALVES E, F & D AND STROKE PUMP J UNTIL THE FLOW FROM PIPE K INDICATES ELIMINATION OF ALL AIR POSSIBLE.
 3. CLOSE VALVE F AND AT THE SAME TIME MAINTAIN A SLIGHT BUT STEADY OIL PRESSURE WHILE THE AFTER CYLINDERS ARE BEING VENTED AT M AND N.
 4. AFTER CLOSING THESE VENTS, OPEN VALVE H AND STROKE PUMP UNTIL OIL LEVEL IS ABOUT 1/2 FROM TOP OF GAGE GLASS L, THEN CLOSE VALVE E, STOP PUMPING AND CLOSE VALVES D AND H.

OPERATION

1. WHEN THE SYSTEM HAS BEEN PROPERLY VENTED AND ALL VALVES CLOSED THE TELEMOATOR IS READY FOR OPERATION.
 2. FOR TELEMOATOR WITH BRIDGE STAND CONNECTION ENGAGE THE CONNECTING CLUTCH BY MEANS OF HANDWHEEL W WHEN BRIDGE STAND CONTROL IS DESIRED.
 3. FOR ELECTRIC STEERING OPEN BYPASS VALVE D. IF BYPASS VALVE INTERLOCK SWITCH IS INSTALLED, OPENING VALVE D WILL AUTOMATICALLY CLOSE BYPASS VALVE INTERLOCK SWITCH V PERMITTING ELECTRIC STEERING CONTROL.

LUBRICATION

FORWARD UNIT

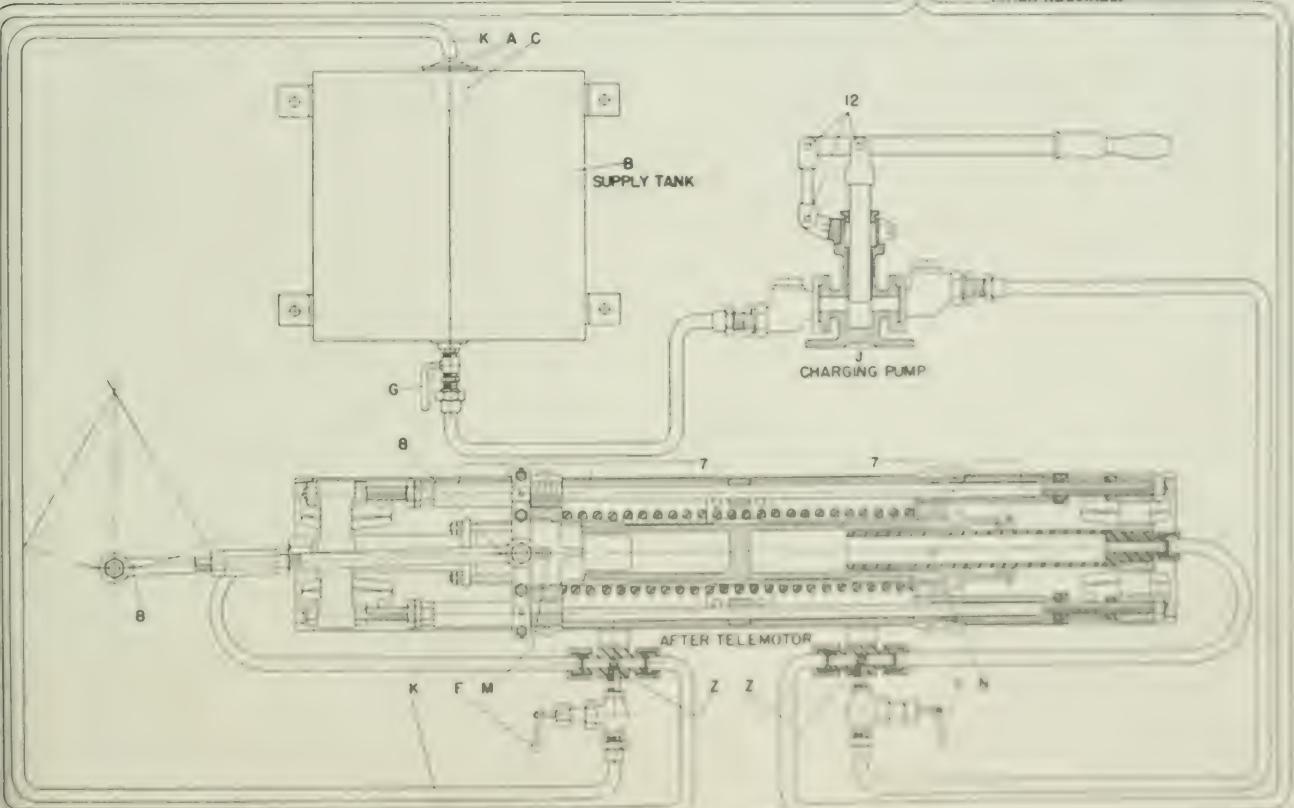
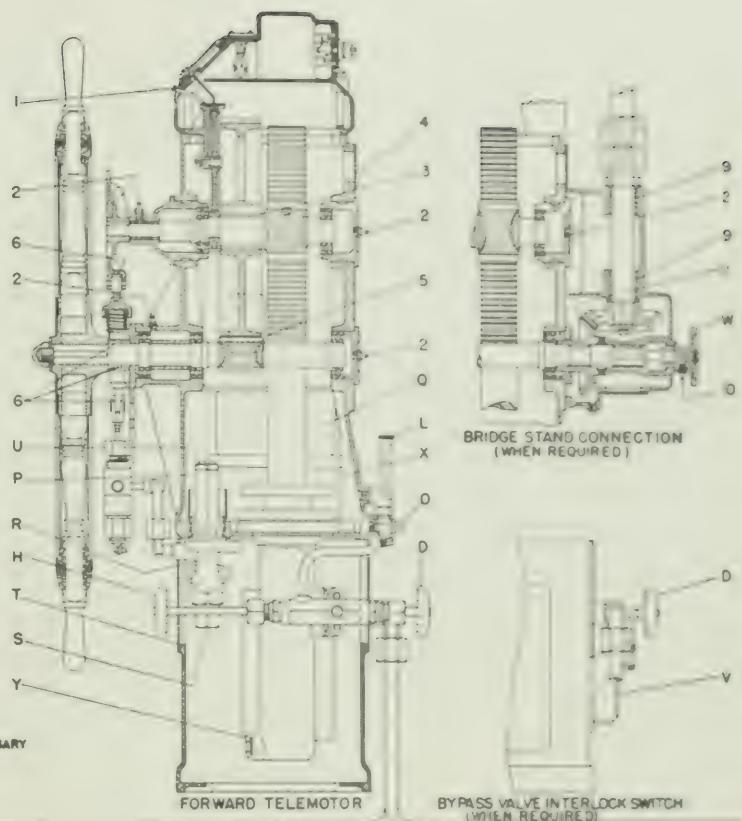
	NO. OF PLACES	METHOD	LUBRICANT	APPLICATION
1. INDICATOR GEAR RACK.	2	OIL CAN	LIGHT OIL	WEEKLY
2. SHAFT BEARINGS	4	GUN	MEDIUM GREASE	MONTHLY
3. RACK & PINION TEETH	2	GUN	MEDIUM GREASE	MONTHLY
4. INT. GEAR & PINION TEETH	1	BRUSH	GEAR GREASE	WEEKLY
5. AUTO BYPASS LINKAGE	1	BRUSH	GEAR GREASE	WEEKLY
6. BYPASS LINKAGE	6	OIL CAN	LIGHT OIL	WEEKLY

AFTER UNIT

	NO. OF PLACES	METHOD	LUBRICANT	APPLICATION
7. THE RODS & STOP SLEEVES	12	OIL CAN	LIGHT OIL	DAILY
8. CONNECTING LINK PINS	4	OIL CAN	LIGHT OIL	DAILY
9. VERTICAL SHAFT BEARINGS (WHEN USED)	2	GUN	MEDIUM GREASE	WEEKLY
10. CLUTCH OPERATING MECHANISM	1	GUN	MEDIUM GREASE	WEEKLY
11. MITER GEARS	1	BRUSH	GEAR GREASE	WEEKLY

CHARGING PUMP

	NO. OF PLACES	METHOD	LUBRICANT	APPLICATION
12. LEVER PINS	3	OIL CAN	LIGHT OIL	WHEN NECESSARY



HYDE HYDRAULIC TELEMOATOR INSTRUCTION CHART

age. Unnecessary tightness will increase the drag on the plunger and increase the effort required to steer.

Cover (T) gives access to replenishing valves (R) and the sediment bulbs (S).

Relief valves (P) are set to relieve at about 1200 p.s.i. Setting is adjusted by screws (U).

INSTALLATION

Connecting Tubing

With the Forward Telemotor installed in its usual position the helmsman faces forward. Then rotation of the top of the steering wheel to the right results in forcing the port plunger down and the starboard plunger up. In other words, when the steering wheel is rotated for right rudder, oil in the port cylinder of the Forward Telemotor is under pressure. Examination of the steering gear will indicate in which direction the double cylinder of the After Telemotor should move for right rudder. This will show which end of the double cylinder should have pressure on it for right rudder. The end of the double cylinder which should have pressure on it for right rudder should then be connected by tubing to the port cylinder of the Forward Telemotor.

The connecting tubing may be run below decks in protected locations with moderate bends to accommodate available space. Tubing should be run in a gradual rise from the After Telemotor to the Forward Telemotor to avoid air pockets. Areas subjected to abrupt temperature changes should be avoided in order to keep volume changes of the oil to a minimum.

It is of utmost importance that all joints and valves in the system be oil-tight.

Alignment

The only alignment necessary during installation of the Telemotor is to check that the connecting links between the After Telemotor and the steering gear are adjusted so that when the After Telemotor is in a central position as determined by its spring, the connecting links hold the steering gear in the amidships position. The connecting links may be adjusted by means of turn-buckles.

The After Telemotor is adjusted in our shop so that the double cylinder is held in a central position by the Telemotor spring unless pressure acts on one end of the double cylinder. The Forward Telemotor is adjusted in our shop so that the automatic bypass valve is open when the steering wheel is in the amidships position. Therefore, each time the steering wheel is placed amidships, the After Telemotor will center itself, since there is no pressure on either end of the double cylinder.

The After Telemotor is adjusted in our shop so that full travel in either direction from the central position is six inches, or a total travel of twelve inches. Hyde Windlass Company steering gears are designed so that twelve inches travel of the linkage actuated by the After Telemotor moves the rudder from hardover to hardover. The length of travel may be adjusted if necessary. Referring to Page 16, the position of the sleeve, Part (17), determines the length of travel, with the locknuts at the ends of the sleeves acting as stops. The sleeve (17) screws into the spring seat (7) and may be screwed in or out to make adjustments. The length of travel from the central position to hardover is equal to the distance from the cylinder yoke (6) to the locknuts at the end of the sleeve (17). A setscrew in each spring seat (7) secures each sleeve when adjustment is complete. Care must be taken to adjust both stops on each end of the After Telemotor so that they are as equal as practical to prevent the possibility of one stop taking all the load. Travel in both directions from the central position should also be adjusted so they are equal.

Flushing Out The System

The newly installed Telemotor must be thoroughly flushed out to remove any foreign matter which may be accumulated in the system during installation. Flushing should be done with the same kind of oil that will be used in the system for operation.

Fill the supply tank (B) through strainer (C). Open cock (G), valves (D), (E) and (F) and stroke charging pump (J) until the discharge into the tank (B) is free of foreign matter. This will flush tank (B) and the tubing system. Replenishing reservoir (X) in the Forward Telemotor should be swabbed out with oil. Access to (X) may be had through covers (Q). All flushing oil should be removed from the system preparatory to charging the system with clean oil for operation.

Draining The System

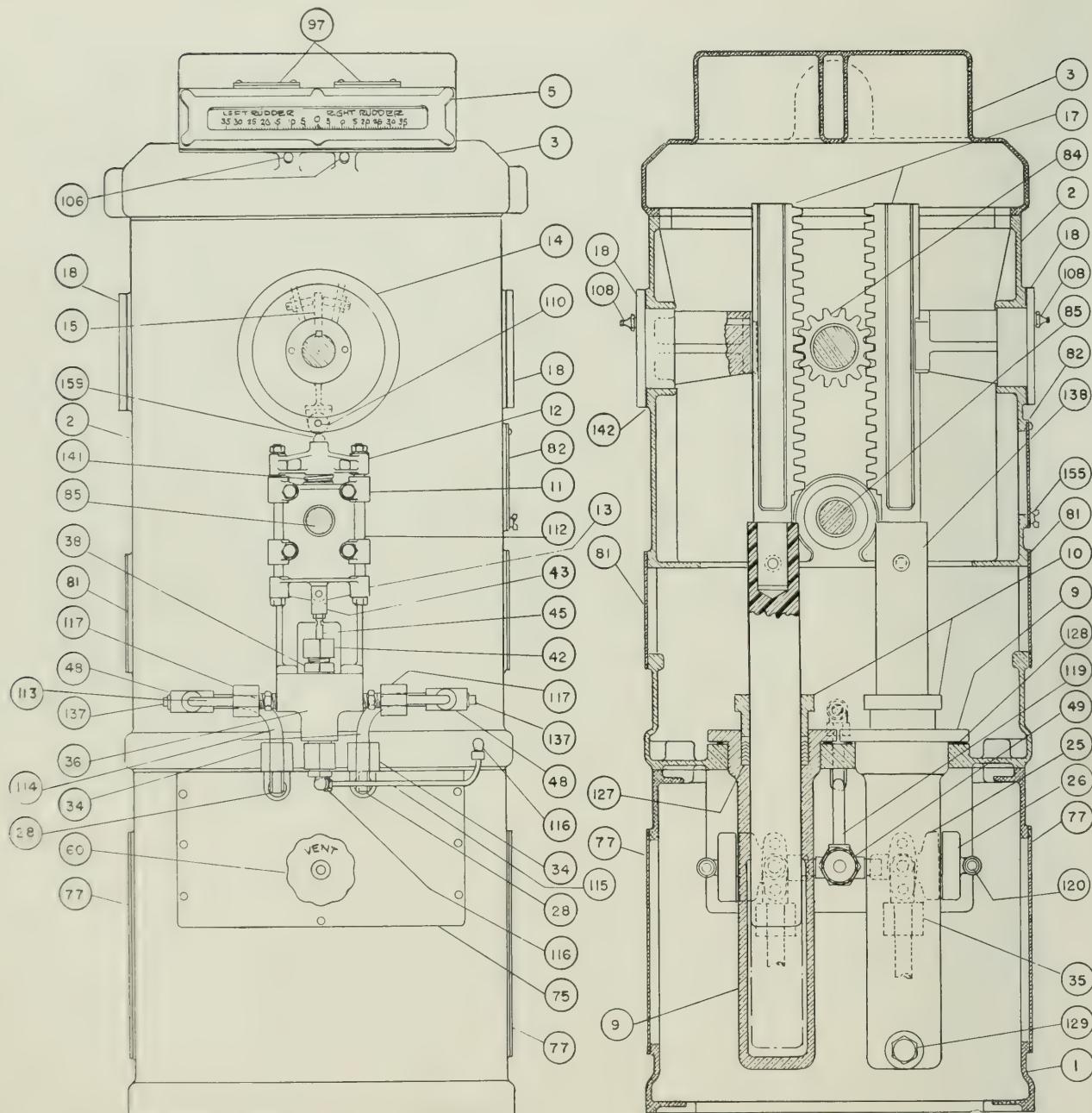
The main system may be drained by removing drain plugs (Z). Valves (D), (E), (F) and (H) should be open.

Drain plugs (Y) are provided for draining cylinder and sediment bulbs (S) are provided for draining the relief and replenishing valves (R). Drain cock (O) is provided for draining the replenishing reservoir only.

Telemotor Oil

The oil used for the hydraulic system is the type that is sold by most manufacturers under the title "Telemotor Oil." This oil must be a low cold test mineral oil of about 100 seconds viscosity Saybolt at 100 degrees Fahrenheit.

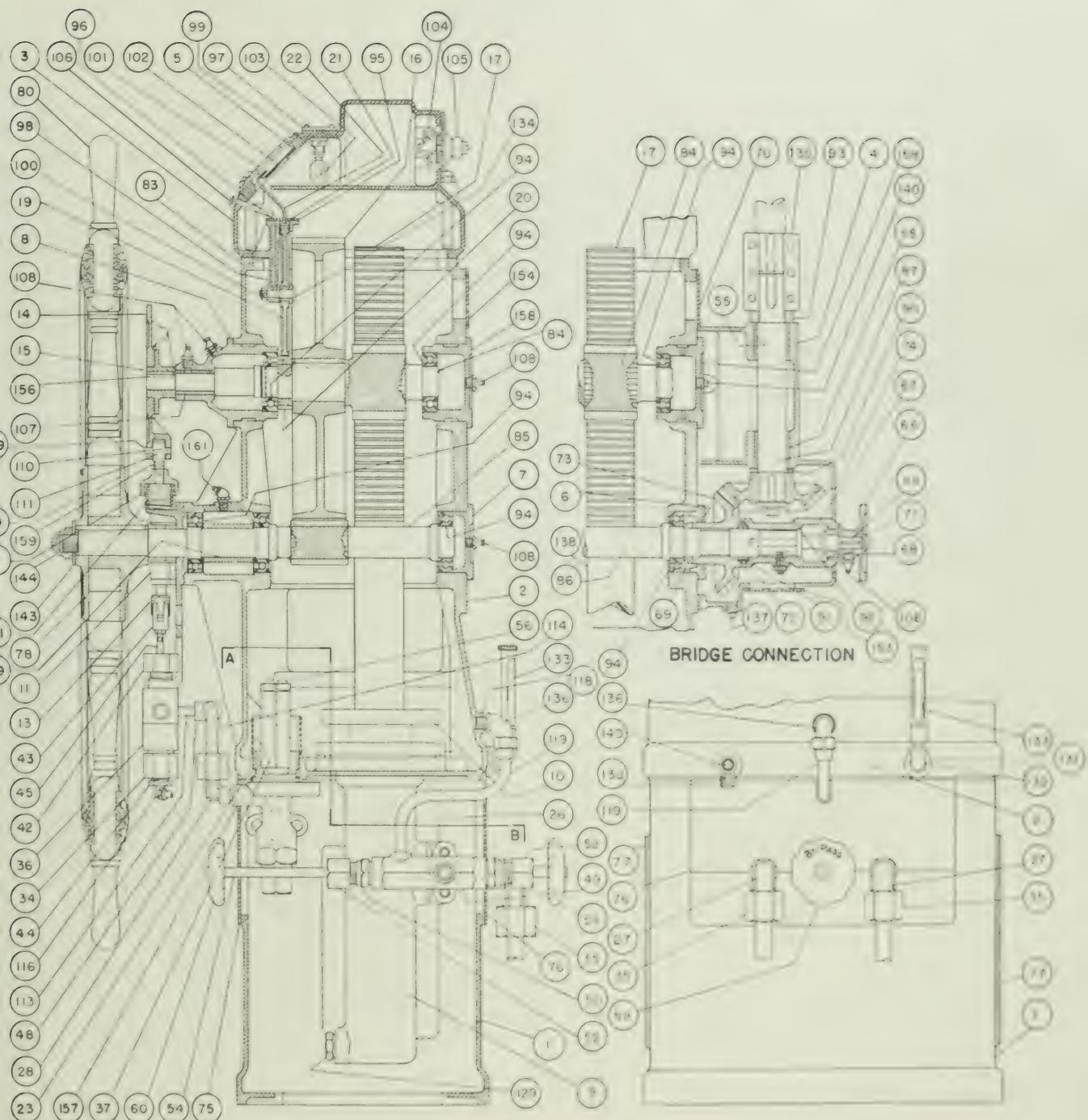
LIST OF PARTS — FORWARD TELE MOTOR



1	BASE
2	CASING
3	TOP COVER
4	MITRE GEAR SHAFT BEARING AND GEAR GUARD
5	INDICATOR COVER
6	STEERING WHEEL SHAFT BEARING RETAINER
7	STEERING WHEEL SHAFT BEARING RETAINER
8	RACK PINION SHAFT BEARING CAGE
9	CYLINDER
10	GLAND
11	AUTOMATIC BYPASS FRAME
12	UPPER CROSS BAR
13	LOWER CROSS BAR
14	ROLLER CARRIER
15	ROLLER CARRIER HUB
16	INTERMEDIATE GEAR
17	PLUNGER RACK
18	RACK GUIDE

19.	INDICATOR GEAR
20.	INDICATOR PINION
21.	INDICATOR RACK
22.	INDICATOR POINTER
23.	REPLENISHING VALVE BODY
25.	CROSS
26.	SPECIAL ELBOW
27.	SPECIAL ELBOW
28.	SPECIAL ELBOW
34.	NUT (UNION)
35.	NUT (UNION)
36.	AUTOMATIC BYPASS VALVE BODY
37.	RELIEF VALVE BODY
38.	STUFFING BOX
42.	GLAND NUT
43.	VALVE STEM KNUCKLE
44.	PLUG
45.	VALVE STEM
48.	PIPE TEE
49.	BYPASS VALVE BODY
50.	STUFFING BOX

52.	GLAND NUT
54.	VENT VALVE STEM
55.	BUSHING
56.	ADJUSTING SCREW
59.	BYPASS HANDWHEEL
60.	VENT HANDWHEEL
*66.	HANDWHEEL
*67.	CLUTCH
*68.	CLUTCH BUSHING
*69.	MITRE GEAR THRUST COLLAR
*70.	COVER
*71.	CLUTCH CONTROL SCREW CAP
*72.	BRUSH HOLE COVER (FAR SIDE)
*73.	MITRE GEAR (WITH CLUTCH GRABS)
*74.	MITRE GEAR
75.	FRONT COVER
76.	BACK COVER
77.	SIDE COVER
78.	STEERING WHEEL HUB
79.	STEERING WHEEL HUB
80.	WOOD STEERING WHEEL

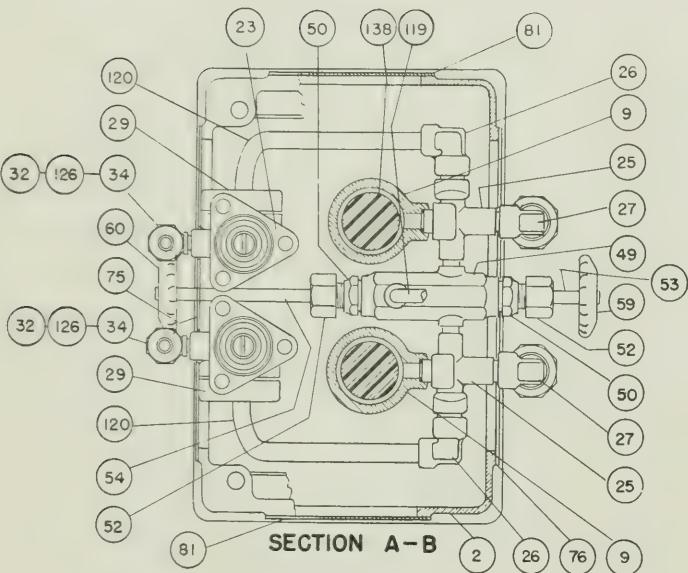


BRIDGE CONNECTION

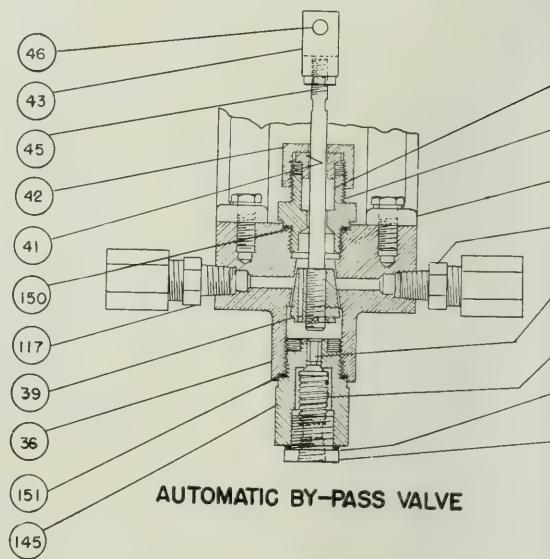
81	COVER	1	INCANDESCENT LAMP
82	COVER	104	WATER THERM
83	INDICATOR RACK GUIDE SHIM	105	SWITCH
84	NACK PINION SHAFT	106	PLAIN DRIVE OILER
85	STEERING WHEEL SHAFT	107	BUSHING
86	STEERING WHEEL SHAFT	108	HYDRAULIC GREASE FITTING
87	MITRE GEAR SHAFT	110	BUSHING
88	CLUTCH CONTROL SCREW	111	ROLLER
89	BEARING SPACER	112	TIE ROD
90	THRUST COLLAR	113	PIPE
91	CLUTCH THRUST BUSHING	114	PIPE
92	SHAFT CAP	115	PIPE
93	THRUST COLLAR	116	ELBOW
94	SKF BEARING NO. 6208Z	117	PIPE, M
95	INDICATOR RACK COVER	118	NIPPLE
96	INDICATOR RACK COVER	119	PIPE
97	LAMP BASE COVER	120	PIPE
98	INDICATOR RACK BRACKET	121	PIPE
99	LAMP BASE	122	GASKET
100	IDLER GEAR STUD	123	DRAIN PLUG
101	INDICATOR GLASS	124	DRAIN OFF COCK
102	INDICATOR DIAL	125	BUSHING

MS MARKED * USED ONLY WITH BRIDGE SPANNING TECHNIQUE

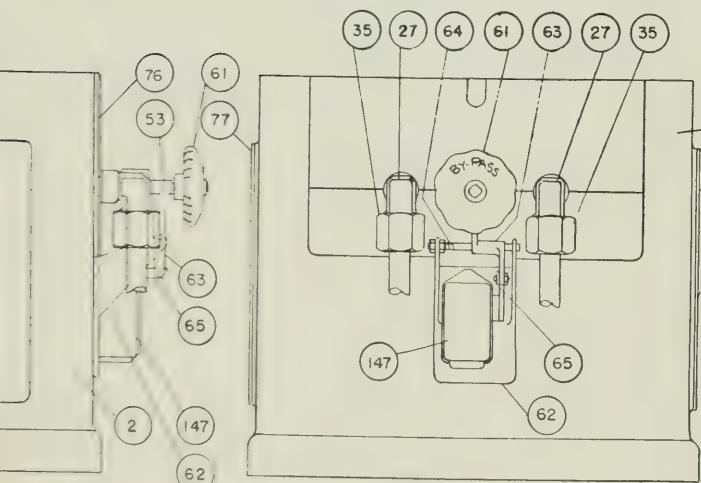
LIST OF PARTS — FORWARD TELE MOTOR



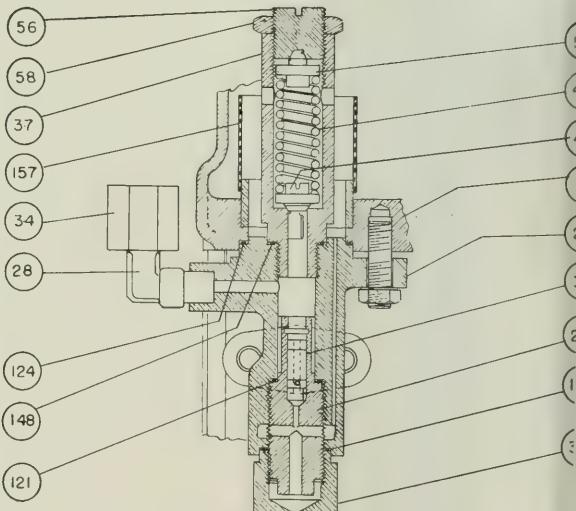
SECTION A-B



AUTOMATIC BY-PASS VALVE



BY-PASS SWITCH CONTROL



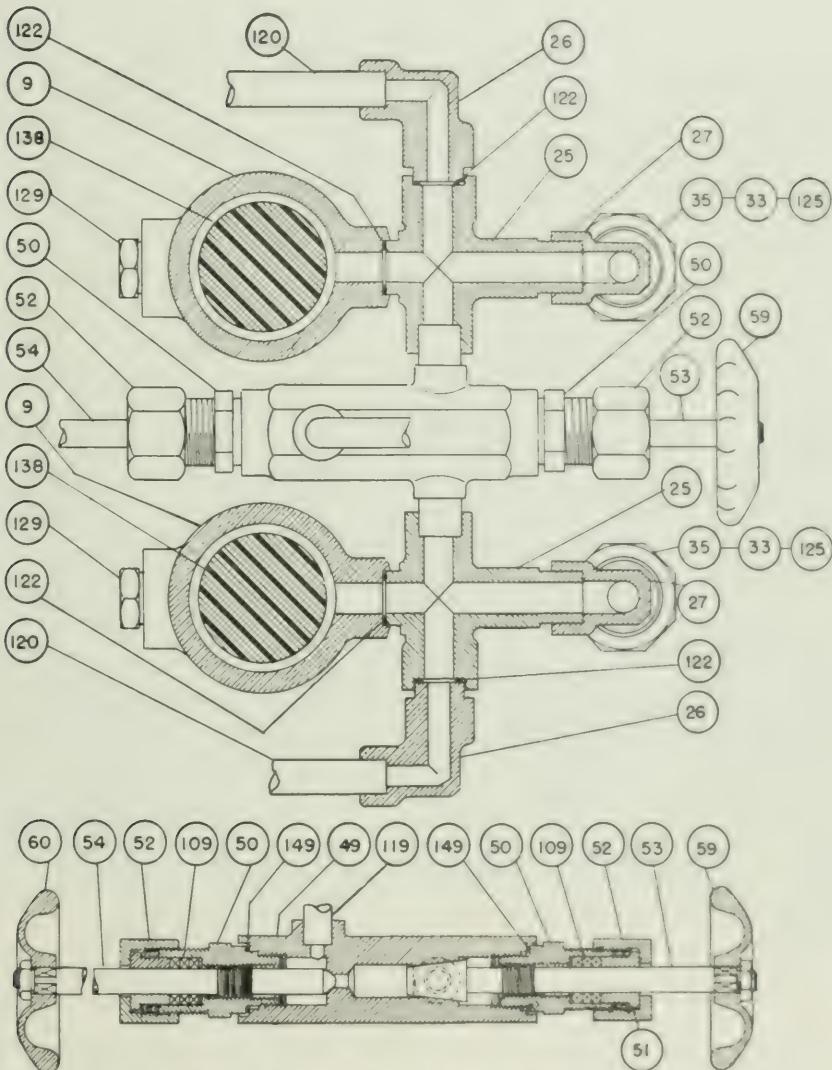
REPLENISHING AND
RELIEF VALVES

2. CASING
 9. CYLINDER
 11. AUTOMATIC BYPASS FRAME
 23. REPLENISHING VALVE BODY
 24. REPLENISHING VALVE BEAT
 25. CROSS
 26. SPECIAL ELBOW
 27. SPECIAL ELBOW
 28. SPECIAL ELBOW
 29. PIPE FLANGE
 30. REPLENISHING VALVE NUT
 31. REPLENISHING VALVE

32. TAIL PIECE
 33. TAIL PIECE
 34. NUT (UNION)
 35. NUT (UNION)
 36. AUTOMATIC BYPASS VALVE BODY
 37. RELIEF VALVE BODY
 38. STUFFING BOX
 39. AUTOMATIC BYPASS VALVE
 40. RELIEF VALVE
 41. GLAND
 42. GLAND NUT
 43. VALVE STEM KNUCKLE

44. PLUG
 45. VALVE STEM
 46. KNUCKLE PIN
 47. RELIEF VALVE SPRING
 49. BYPASS VALVE BODY
 50. STUFFING BOX
 51. GLAND
 52. GLAND NUT
 53. BYPASS VALVE STEM
 54. VENT VALVE STEM
 56. ADJUSTING SCREW

LIST OF PARTS — FORWARD TELEMOTOR

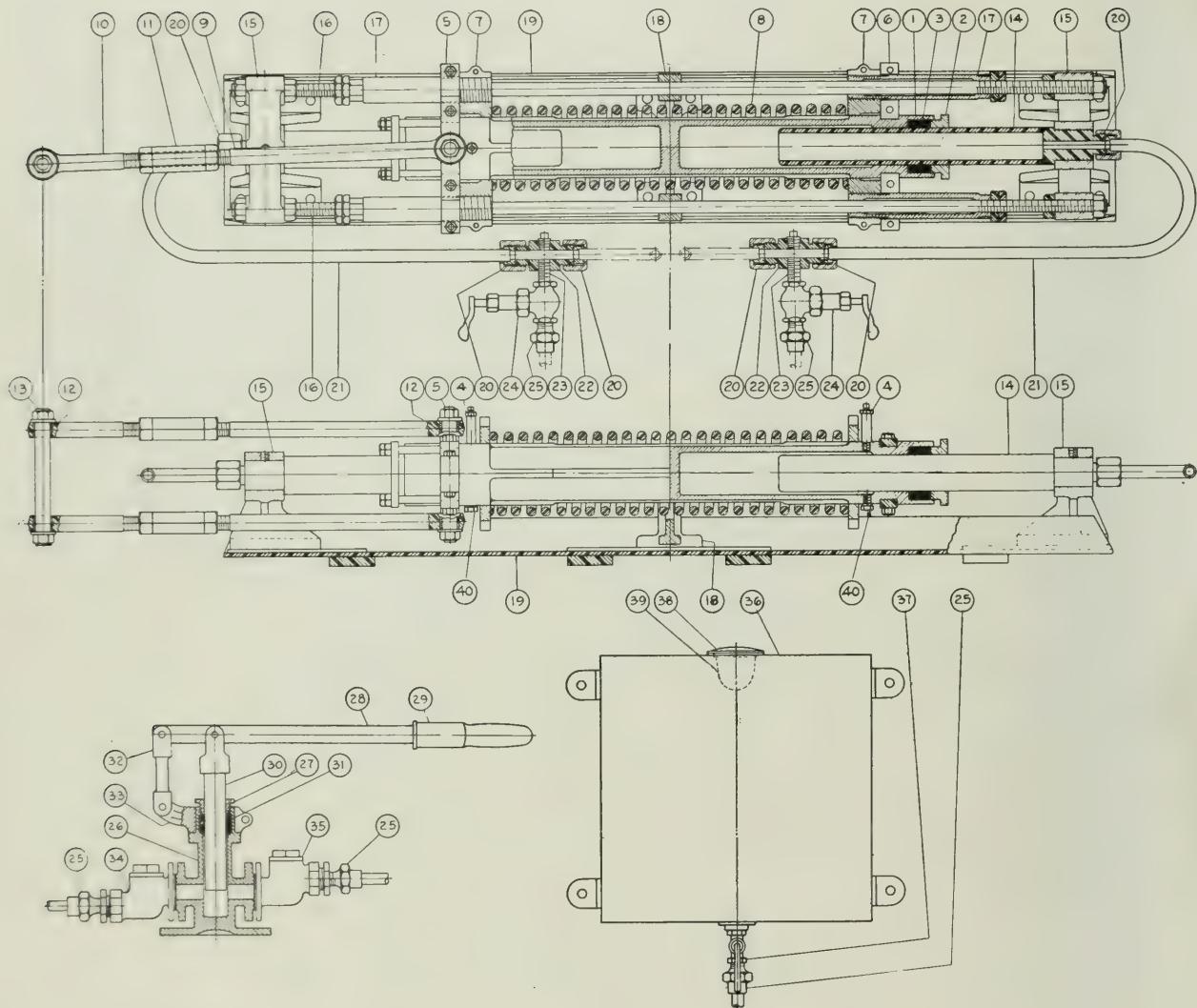


BY-PASS & VENT VALVES AND CONNECTIONS

57	VALVE SPRING SEAT	81	COVER
58	LOCKNUT	109	PACKING
59	BYPASS HANDWHEEL	117	UNION COMPLET
60	VENT HANDWHEEL	119	PIPE
61	BYPASS HANDWHEEL	120	PIPE
62	LEVER BEARING	121	GASKET
63	CONTROL LEVER	122	GASKET
64	LIMIT SWITCH LEVER PIN	123	GASKET
65	LIMIT SWITCH CONNECTING LINK	124	GASKET
75	FRONT COVER	125	RING UNION
76	BACK COVER	126	RING UNION
77	SIDE COVER	129	DRAIN PLATE

ITEMS MARKED USED ONLY WITH BYPASS SWITCH CONTROL

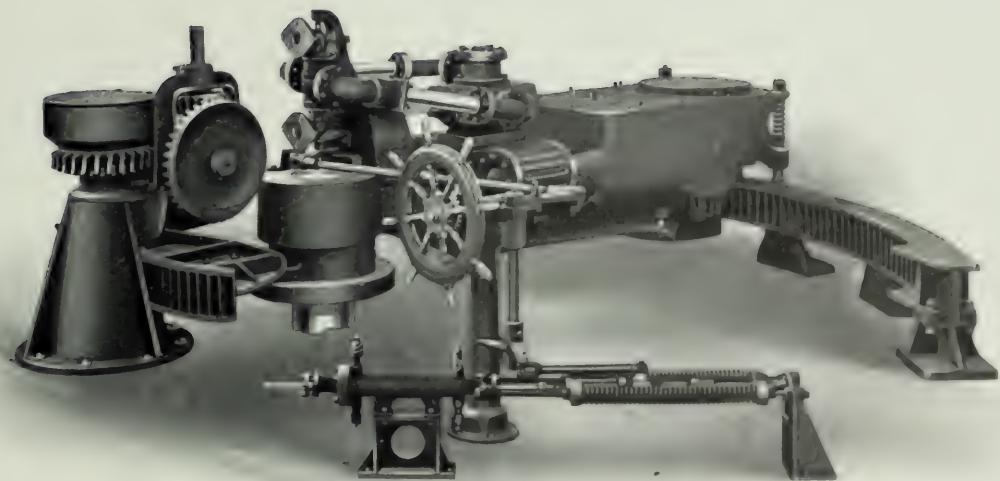
LIST OF PARTS—AFTER TELE MOTOR



1. CYLINDER
2. CYLINDER GLAND
3. PACKING RINGS
4. VENT PLUG
5. CYLINDER YOKE WITH TRUNNIONS (TWO HALVES)
6. CYLINDER YOKE (TWO HALVES)
7. SPRING SEAT
8. SPRING
9. ROD END (LONG)
10. ROD END (SHORT)
11. TURNBUCKLE
12. ROD END BUSHING
13. LINK PIN
14. PLUNGER
15. PLUNGER BRACKET
16. TIE ROD
17. SLEEVE
18. TIE ROD SUPPORT
19. BED PLATE
20. UNION

21. PLUNGER PIPE
22. SPECIAL FITTING
23. NIPPLE
24. GLOBE VALVE
25. MALE AND FEMALE UNION
26. CHARGING PUMP BODY
27. CHARGING PUMP BODY GLAND
28. CHARGING PUMP LEVER
29. CHARGING PUMP HANDLE
30. CHARGING PUMP PLUNGER
31. CHARGING PUMP PACKING
32. CHARGING PUMP LINK
33. CHARGING PUMP YOKE
34. CHARGING PUMP OUTLET CHECK VALVE
35. CHARGING PUMP INLET CHECK VALVE
36. TELE MOTOR SUPPLY TANK
37. TELE MOTOR SUPPLY TANK PLUG VALVE
38. TELE MOTOR SUPPLY TANK FILLER CAP
39. TELE MOTOR SUPPLY TANK STRAINER
40. DRAIN PLUG

The
Brown Type Steam Tiller



Hyde Windlass Company
Bath, Maine

The Brown Type Steam Tiller

Many steamships have their steering engines placed near the bridge, the communication being made with the quadrant aft by means of chain, rods, or wire ropes, with or without spring buffers to take off the shock of a heavy sea. In conjunction with this, hand gear is fitted aft, having double screws with nuts and crosshead, the mode of connection being by pins dropping into connecting links, or by a clutch working on the rudderhead and engaging the crosshead.

The trouble involved in keeping these steering ropes or rods properly adjusted and the various pulleys properly oiled, as well as danger arising from the ropes being carried away, has brought about a change in more recent applications of steering gear. The steering engine is placed aft, being coupled by right and left-hand screws, and in a variety of other ways, direct to the rudderhead, communication from the steering valve being made by a line of shafting to the bridge, thus dispensing with the objectionable rope or rod communication, which is, in the first-mentioned system, subjected to the full rudder strains.

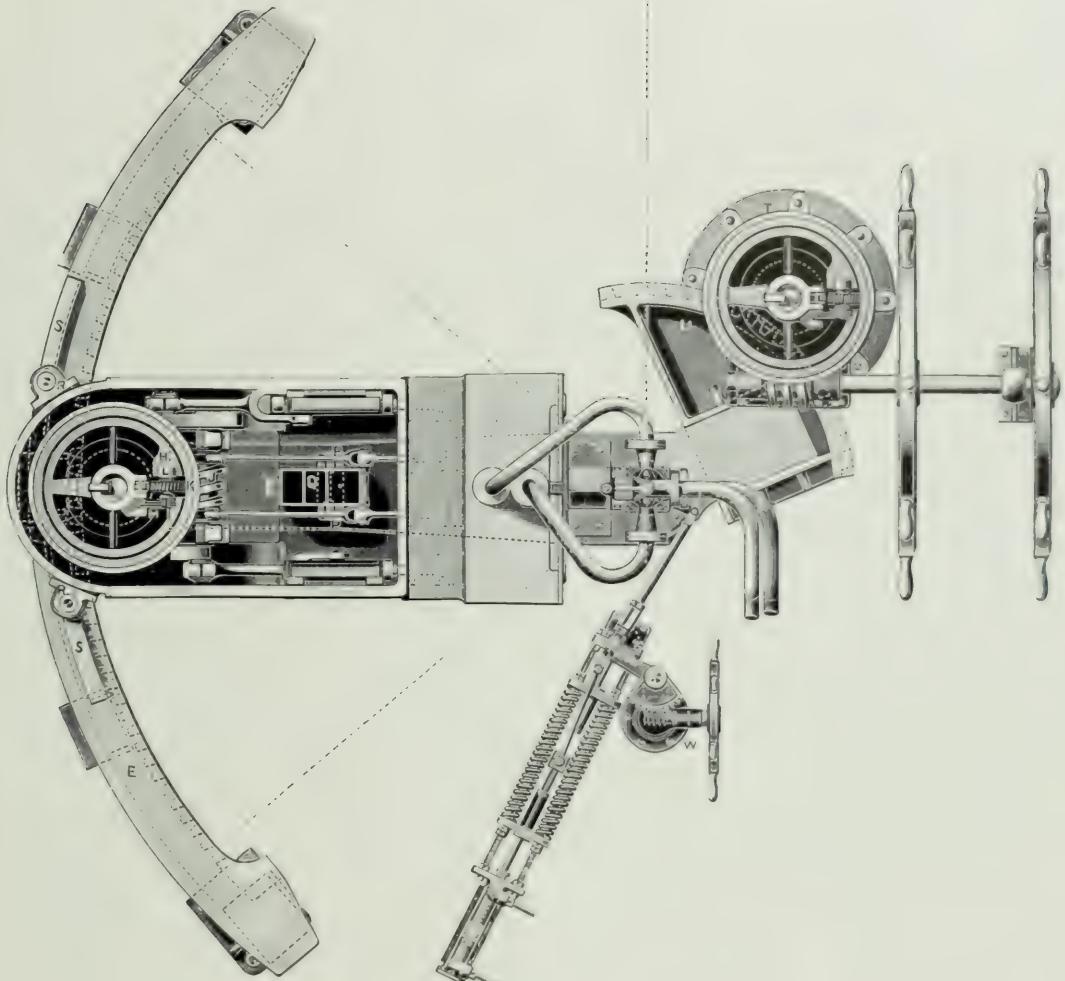
An ideally perfect steering gear should fulfill the following conditions:

1. The steering engine should be attached to the rudderhead without the intervention of chains or ropes.
2. It should let go the rudder when unduly strained, and when the abnormal strain has gone, return automatically to its former position.
3. The connection from steam to hand gear, and vice versa, should be effected without the use of jaw clutches or the slipping of bolts into holes—which operations are difficult to effect when the ship is rolling at sea with the rudder adrift.
4. The communication from the bridge to the machinery aft should be of a kind which dispenses with rods, chains and shafting, all being equally troublesome to the shipbuilder to arrange and to the officers of the ship to keep in order.

With reference to Condition 3, it is a common practice to fit rubber brakes on ships where clutches are the means of connection; but as simplicity and fewness of parts are of first importance in steering gear, it is better that such a connection between the steering engine and the rudder, or the hand gear and the rudder, should be one which will act both as a clutch and a brake.

To meet these conditions as far as possible, the Steam Tiller has been designed. In the accompanying illustration, Fig. 1 shows an elevation with hand steering gear, Fig. 2 being the plan. The prominent feature of this gear, in which it differs from all others, is that advantage is taken of as long a lever as will reach from the rudderhead to the limits of the poop deck, which, in the greatest number of ships, varies from 7 to 10 feet, and in the largest class of vessels has reached the length of 17 feet.

It will be obvious that the strains at the end of such a lever will be reduced to the smallest possible amount, and that the gear necessary to give the requisite power to steering the ship will be of the simplest form.



N°1

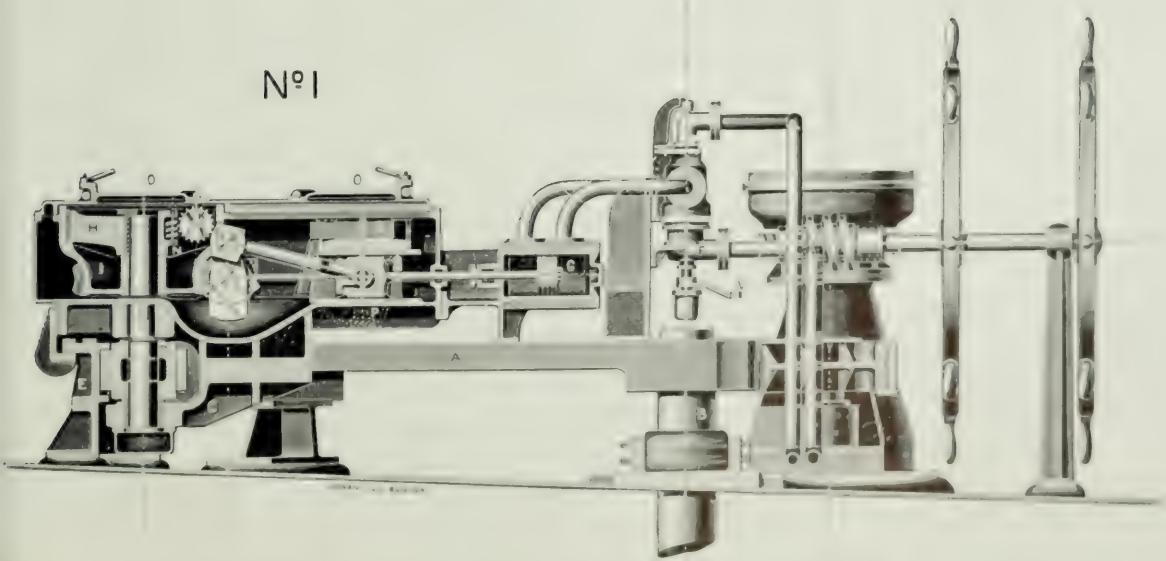


FIG. I

Description of the Steam Tiller

The Tiller as shown in Fig. 1, "A," keyed to the rudderhead, "B," and at the other end a jaw "C" is fitted with gun metal bearings, into which a driving pinion "D" works, gearing into the toothed segment "E," which is bolted securely to the deck. The steering engines are carried on the Tiller and move round with it, receiving and exhausting their steam through a double stuffing box arrangement "F." mounted on the axis of the rudderhead.

The steam cylinders "G" are of the usual well-known construction, fitted with piston valves. Motion is communicated to the pinion "D," through the intervention of an expanding friction clutch "H," which is lined with friction material, and engages the worm wheel "I." This wheel, to reduce friction, is carefully machined in the teeth, and made an exact fit to the worm "J," which is of bearing bronze, and works in the worm wheel without any backlash or shake.

Motion is given to this worm by the steam engine as shown. The clutch "H" is expanded by a screw bolt and worm wheel "K," which turns in and out of the nut "L" at one end, the other abutting against a series of laminated springs "M," so that by turning the worm "N" by a handle (provided for the purpose) to the right or left, the steam gear is engaged or disengaged at any position the rudder may be in, and at the same time it forms an efficient brake to seize hold of the rudder in a seaway.

In practice it is usual to expand this friction brake or clutch sufficiently tight to put the rudder hard over at full speed trials; but the springs in any case have not sufficient force to hold the connection tight enough to cause fracture of any part of the machinery.

In the event of a heavy sea striking the rudder, it immediately slips, allowing the rudder to move out of position; but by that act the steam valve is opened and the engines bring the rudder back to its normal place. As the Steam Tiller is intended to work (and in most cases has been so fitted) on the open deck, without any house, the whole of the machinery is placed in a water-tight casing, which forms the framework of the steering engines, access to which is got by the doors "OO."

The oiling of the various parts is effected automatically by two valveless oil pumps "PP," driven off the valve rods of the engine. These throw the oil from a well in the bottom of the casing through the hollow piston rod into the reservoir "Q," and from there a copious supply of oil is supplied to every working part, as well as the piston and valve rods. In actual practice the oil is renewed once in three months, about two gallons being required.

This oiling arrangement is of the utmost importance to the durability of the machinery, as it has been found in a year's experience (June, 1892) of the running of a set in the steamship "Scot," on removing the cover with the intention of doing some repairs, that none of the bearings required taking up — showing clearly that, where dirt is kept out and copious lubrication applied, there is practically no wear.

The "Campania," after two years' work on the Atlantic, had her steering engine overhauled for the first time, and all that was done was to clean the parts, the wear being entirely on the oil and none on the bearing surfaces.

The pinion end of the tiller is carried up by gun metal slippers and spiral springs under the lugs "RR," which are capable of adjustment.

The hand gear consists of a strong standard "T," bolted to the deck, and carrying an exactly similar worm wheel, and worm with hand wheels and friction clutch as that described in the steam gear. At the lower end of the shaft there is a similar pinion to "D," which engages the toothed segment "U," which is securely bolted to the Steam Tiller, or keyed separate to rudderhead.

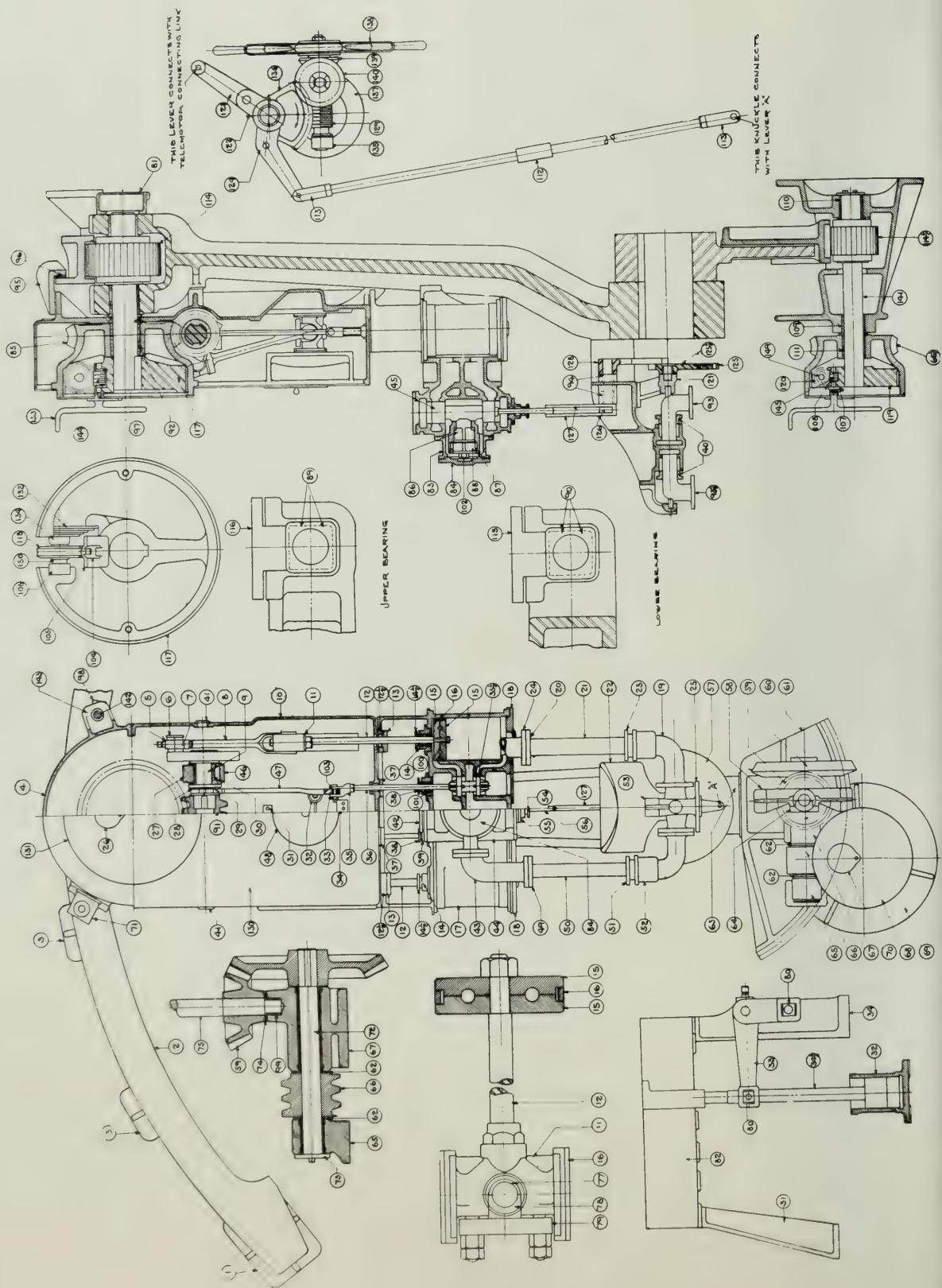
The operation in changing from hand to steam or steam to hand by means of these clutch brakes can be, and has been performed, without any undue haste, in half a minute. It may here be pointed out that the result of actual experience is that, with this system of hand gear, the friction is one third of that of the double screw system with nuts and connecting rods to a crosshead on the rudderhead. Therefore, one man on the worm wheel gear is as effective as three on double screws.

The hand wheels, it will be observed, are set to one side of the center line, which economizes space fore and aft, and brings the position of the man steering immediately opposite the compass.

The control valve is operated by the lever "V," and as the tiller moves round it carries the valve with it and so closes the port. The lever "V" is connected to the motor cylinder of the telemotor gear. From the motor cylinder leading up to the bridge are two pipes $\frac{3}{4}$ -inch in diameter. In case of accident to these pipe communications to the bridge, a steering station "W" is shown aft, which can be connected to the control valve.

It is claimed for this design of steering gear that it has the fewest number of parts possible — namely, one pinion, one worm wheel and worm — which, it can easily be seen, is due to the fact that the toothed segment represents in a 10-foot tiller a steering wheel 20 feet in diameter, and this rack being shrouded to the points of the teeth and bolted at short intervals to the steel deck, is extremely secure. The pinion which engages this is a steel forging with machine-cut teeth.

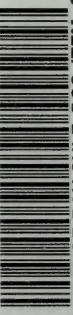
From a commercial point of view, there is a distinct saving in the adoption of such a design, as no space is required for a steering engine amidships.



List of Parts for Steam Tiller

1. End Chair.	51. Copper Pipe Gland.	105. Worm Shaft Cap.
2. Rack.	52. Copper Pipe Fitting & Flange.	106. Expanding Screw Nut.
3. Intermediate Chair.	53. Trunnion Stand Bracket.	107. Keeper.
4. Pan End.	54. Control Valve Stem Stuffing Box Gland.	108. Worm Shaft Cap.
5. Connecting Rod Half Box.	55. Control Valve Stem Stuffing Box.	109. Flange Bushing.
6. Crank Web.	56. Control Valve Stem.	110. Flange Bushing.
7. Connecting Rod Half Box.	57. Main Tiller.	111. Hand Worm Gear Bushing
8. Connecting Rod.	58. Control Shaft Bearing.	112. Turnbuckle.
9. Crank Shaft.	59. Bevel Pinion.	113. Telemotor Rod Knuckle.
10. Engine Pan.	60. Bevel Gear.	114. Hand Pinion.
11. Crosshead.	61. Sector.	115. Tiller Lower Bearing Cap.
12. Piston Rod.	62. Thrust Collar.	116. Tiller Upper Bearing Cap.
12½. Piston Rod Stuffing Box.	63. Hand Tiller.	117. Engine Expanding Clutch.
13. Piston Rod Gland.	64. Control Shaft Bearing Cap.	118. Engine Expanding Worm Gear.
14. Piston Rod Stuffing Box.	65. Worm Shaft Bearing.	119. Hand Expanding Clutch.
14½. Piston Rod Stuffing Box Gland.	66. Hand Worm.	120. Hand Expanding Worm Gear.
15. Half Piston.	66½. Hand Worm Gear.	121. Telemotor Lever Bearing.
16. Piston Ring.	67. Worm Shaft Bearing.	122. 4" Lever.
17. Double Cylinder.	68. Hand Gear Cover.	123. 12" Lever.
18. Cylinder Cover.	69. Hand Gear Stand.	124. 12" Lever.
19. Copper Pipe Fitting & Flange.	70. Hand Hole Cover.	125. Telemotor Lever.
20. Copper Pipe Flange.	71. Buffer Spindle Bearing.	125½. Telemotor Lever Bushing.
21. Copper Pipe.	72. Worm Shaft.	126. Valve Stem Lever.
22. Trunnion Stand.	73. Collar.	127. Valve Stem Lever Link.
23. Copper Pipe Gland.	74. Collar.	128. Block Lever.
24. Steam Pipe Fitting & Flange.	75. Control Shaft.	129. Sector Worm Shaft.
25. Steam Pipe Connection.	76. Crosshead Gib.	130. Engine Pan Cover.
26. Hand Hole Cover.	77. Crosshead Half Box.	131. Engine Gear Cover.
27. Main Bearing Box (Bottom).	78. Crosshead Half Box.	132. Flat Spring.
28. Eccentric Strap (Half).	79. Crosshead Binder.	133. Socket Wrench.
29. Eccentric Strap (Half).	80. Pump Lever Bushing.	134. Rocker.
30. Main Bearing Box.	81. Drip Oil Box.	135. Worm Shaft Bearing.
31. Oil Pump Bracket.	82. Oil Pump Oil Tank.	136. Sector.
32. Oil Pump Cylinder.	83. Check Valve Body.	137. After Stand.
33. Bell Crank Pump Lever, (Right Hand).	84. Check Valve Body Cover.	138. Steering Wheel.
33½. Bell Crank Pump Lever, (Left Hand).	85. Engine Worm Gear.	139. Mitre Gear.
34. Oil Pump Bracket For Pump Lever.	86. Check Valve (Lower).	140. Mitre Gear with Clutch Grabs.
34½. Oil Pump Piston.	87. Check Valve Seat.	141. Hand Gear Shaft.
35. Valve Stem Knuckle.	88. Check Valve (Upper).	142. Buffer Spindle.
35½. Piston Valve.	89. Tiller Upper Bearing Box.	143. Buffer Spindle Spring.
36. Valve Stem.	90. Tiller Lower Bearing Box.	144. Engine Expanding Clutch Worm.
37. Valve Stem Gland.	91. Engine Worm.	145. Hand Expanding Clutch Worm.
38. Valve Stem Stuffing Box Gland.	92. Engine Gear Bushing.	146. Hand Expanding Clutch Flat Spring (Not Shown).
39. Valve Stem Stuffing Box.	93. Exhaust Pipe Connection.	147. Hand Expanding Clutch Screw Nut (Not Shown).
40. Trunnion Stand Gland.	93½. Steam Pipe Connection.	148. Hand Expanding Clutch Rocker (Not Shown).
41. Plug.	94. Bushing.	149. Hand Expanding Clutch Screw.
42. Control Valve Cover.	95. Rack Guide.	150. Engine Expanding Clutch Screw.
43. Pipe Fitting and Flange.	96. Rack Guide Shoe.	
44. Control Valve Body.	97. Flange Bushing.	
45. Control Valve Piston Valve.	98. Buffer Feet.	
46. Main Bearing Cap.	99. Bushing.	
47. Eccentric Rod.	100. Piston Rod Stuffing Box Gland Bushing.	
48. Hand Hole Cover.	101. Valve Stem Stuffing Box Gland Bushing.	
49. Copper Pipe Flange.	102. Nut.	
50. Copper Pipe.	103. Eccentric Rod Bushing.	
	104. Keeper.	

UTL AT DOWNSVIEW



D RANGE BAY SHLF POS ITEM C
39 11 21 17 12 004 6